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Cooperative **ECONOMIC INSECT REPORT**

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PLANT PEST CONTROL DIVISION

AGRICULTURAL RESEARCH SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PEST CONTROL DIVISION

SURVEY AND DETECTION OPERATIONS

The Cooperative Economic Insect Report is issued weekly as a service to American Agriculture. Its contents are compiled from information supplied by cooperating State, Federal, and industrial entomologists and other agricultural workers. In releasing this material the Division serves as a clearinghouse and does not assume responsibility for accuracy of the material.

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United States Department of Agriculture
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Hyattsville, Maryland 20782

COOPERATIVE ECONOMIC INSECT REPORT

HIGHLIGHTS

Current Conditions

GREENBUG damaging in 13 counties in northern Texas; also reported in several other States. (p. 91).

CLOVER ROOT BORER damage heavy on alfalfa in Franklin County, Washington. (p. 92).

POTATO TUBERWORM potential problem in Baldwin County, Alabama, (p. 92); moderate in several thousand bushels of stored potatoes in Blair County, Pennsylvania, and serious problem to shippers (p. 94).

GREEN PEACH APHID very heavy on vegetables in Maricopa County, Arizona. (p. 92).

CITRUS RED MITE spreading into new areas of citrus in Yuma County, Arizona. (p. 93).

CATTLE LICE heavy in areas of Arkansas, Oklahoma, and Arizona. NORTHERN FOWL MITE increasing in poultry flocks in northwest Arkansas. (p. 94).

Prediction

Heavy PALE WESTERN CUTWORM adult flights in western Nebraska during 1967 indicate possible heavy larval infestations in that area in 1968. (p. 116).

Detection

GLOBOSE SCALE reported for first time in Maryland. (p. 92).

For new county records see page 96.

Special Reports

Summary of Insect Conditions in the United States - 1967

Introduction (p. 97).

Special Insects of Regional Significance (pp. 97-105).

Corn, Sorghum, Sugarcane (pp. 105-114).

Small Grains (pp. 114-117).

Turf, Pastures, Rangeland (pp. 118-121).

Preparation of Notes for Cooperative Economic Insect Report (p. 122).

Reports in this issue are for week ending February 16 unless otherwise indicated.

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WEATHER OF THE WEEK ENDING FEBRUARY 19

HIGHLIGHTS: Mild, mostly dry weather continued west of the Rockies in sharp contrast to the severe cold, changeable weather from the Continental Divide to the Atlantic coast.

PRECIPITATION: A weekend storm, with moderate to heavy rains and gale-force winds, ended a long mild, dry spell in the Pacific Northwest. Widespread, mostly light to moderate but locally heavy rains fell over California, the Great Basin, and parts of the Desert Southwest early and late in the week. A blizzard in North Dakota on Friday made driving hazardous and closed many schools. Flurries occurred frequently near the Great Lakes and in the Appalachians. Heavy snow fell in some areas on the lee shore of Lakes Erie and Ontario. Fourteen inches fell at Boonville, New York, on Saturday. Winds reaching 50 m.p.h. prevented the operation of snow plows. Another area of precipitation extended from the eastern plains of New Mexico across southern Oklahoma and northern Texas, Arkansas, central Mississippi, and Alabama, to northern Florida. Snow, sleet, and freezing rain fell over portions of this area. Snow accumulated to 2 to 6 inches in the Texas Panhandle and to 5 to 9 inches in southwestern Oklahoma. Most of this precipitation occurred during the first half of the week and had ended by Thursday. General rains continued along the gulf until Sunday and in Florida until Monday. The topsoil was very dry and the streams were low in much of the central Great Plains where precipitation was sparse. This was especially true in Nebraska, Iowa, and Missouri.

TEMPERATURE: Mild weather continued over the Far West and the Great Basin. Parts of the Southwest averaged 5° to 7° above normal. Winter temperatures returned to the Rockies and persisted from the Great Plains to Atlantic Ocean. In some areas it was the coldest week since mid-January. A large area from Texas to the middle Appalachians and the Carolinas averaged 10° to 15° below normal. Southern Montana and nearby portions of Wyoming and the Dakotas also averaged more than 10° below normal. Most of the eastern two-thirds of the Nation continued cold throughout the week. Some warming occurred on Friday. Chicago, Illinois, registered 47° Friday afternoon before a bone-chilling blast sent her temperature to 1° by Saturday forenoon. The week ended clear and cold over most of the East. (Summary supplied by Environmental Data Service, ESSA.) Weather forecast on page 96.

SPECIAL INSECTS OF REGIONAL SIGNIFICANCE

GREENBUG (Schizaphis graminum) - NEW MEXICO - Ranged 5-25 per linear foot on barley in fields around Roswell, Chaves County. (Mathews). TEXAS - Activity unchanged throughout most of State; however, active in many Rolling Plains counties February 5-9. Damage heavy in Cottle, King, and Motley Counties; moderate in Dickens, Foard, Hardeman, Wilbarger, and Stonewall Counties. Some damage reported from Archer, Childress, Fisher, Wichita, and Young Counties. Activity in panhandle area generally spotted; some counts up to 400 per row foot. Activity in South Plains area very spotted. (Boring et al.). OKLAHOMA - Averaged less than 10 per foot in most areas throughout State. (Okla. Coop. Sur.). ARKANSAS - Ranged few to very light in wheat in northwest area; no increase observed. (Boyer). MISSOURI - This species and corn leaf aphid averaged less than 2 per row foot in wheat and barley in southeastern area. (Munson). KANSAS - None found in Barton, Rush, Russell, Ellsworth, or Rice Counties (Martinez); 0-9 per linear foot in wheat in Kingman, Pratt, Barber, and Harper Counties (Redding); moderate, 25-50 per linear foot, in Phillips County (Simpson, Wilde).

POTATO PSYLLID (Paratrioza cockerelli) - CALIFORNIA - Nymphs and adults heavy on hothouse tomatoes in St. Helena, Napa County. (Cal. Coop. Rpt.).

SPOTTED ALFALFA APHID (Therioaphis maculata) - NEW MEXICO - Very light on alfalfa in Chaves County. (Mathews).

ARMY CUTWORM (Chorizagrotis auxiliaris) - KANSAS - None found in wheat in Rush, Barton, Russell, Ellsworth, or Rice Counties (Martinez), and negative in Phillips County (Simpson, Wilde).

CORN, SORGHUM, SUGARCANE

SOUTHWESTERN CORN BORER (Diatraea grandiosella*) - MISSOURI - Girdled stalks with live larvae averaged 82 percent in 5 Pemiscot and Dunklin County fields. (Munson).

SMALL GRAINS

ENGLISH GRAIN APHID (Macrosiphum avenae) - MISSISSIPPI - Infestations decreased to 10-15 per square foot on small grains in Oktibbeha and Lowndes Counties. (Dinkins). ARKANSAS - Ranged few to very light in wheat in northwest area; no increase noted. (Boyer).

WINTER GRAIN MITE (Penthaleus major) - OKLAHOMA - Light in wheat in north-central area. (Okla. Coop. Sur.).

TURF, PASTURES, RANGELAND

BLACK CUTWORM (Agrotis ipsilon) - FLORIDA - Larval damage moderate to severe on St. Augustine grass at location in Daytona Beach, Volusia County, January 30. Det. by D. H. Habeck. (Pott).

A STINK BUG (Brochymena tenebrosa) - TEXAS - Damaged mesquite and other plants in Gonzales County. (Texas Coop. Rpt.).

* See Scientific Name Change in CEIR 18(7):81, 1968.

FORAGE LEGUMES

PEA APHID (Acyrtosiphon pisum) - ARIZONA - Ranged 600-1,200 per 100 sweeps in alfalfa in Yuma County. (Ariz. Coop. Sur.). NEW MEXICO - Generally light on alfalfa in State. (N.M. Coop. Rpt.). ARKANSAS - Ranged few to very light in northwest area; no increase observed. (Boyer).

THREE-CORNERED ALFALFA HOPPER (Spissistilus festinus) - ARIZONA - Ranged 10-100 per 100 sweeps in alfalfa at Yuma, Yuma County. (Ariz. Coop. Sur.).

LYGUS BUGS (Lygus spp.) - ARIZONA - Ranged 0-20 per 100 sweeps in alfalfa in Yuma, Yuma County; 50 percent adults. (Ariz. Coop. Sur.).

ALFALFA WEEVILS (Hypera spp.) - MISSOURI - H. postica larvae and adults not active in alfalfa in extreme southeastern area. (Munson). MISSISSIPPI - H. postica adults per 15 square feet and eggs and larvae per 20 stems in second-year alfalfa in Pontotoc County: Adults 18, larvae 24, and eggs 3. (Pitre). ARIZONA - H. brunneipennis ranged 0-40 per 100 sweeps in alfalfa in Yuma, Yuma County; many larvae diseased or parasitized. Treatments not made in Yuma County. (Ariz. Coop. Sur.).

CLOVER ROOT BORER (Hylastinus obscurus) - WASHINGTON - Damage heavy on alfalfa in Franklin County. This is a new county record. (Hokanson, Johansen, Feb. 9).

POTATOES, TOMATOES, PEPPERS

POTATO TUBERWORM (Phthorimaea operculella) - ALABAMA - All stages found in packing sheds and volunteer potatoes in Baldwin County. Larvae widespread and tunneling in old potatoes around sheds and in field borders. Pupae and adults present in old potatoes remaining from harvest. Controls underway to reduce infestation. (Coats, Leeper).

GENERAL VEGETABLES

GREEN PEACH APHID (Myzus persicae) - ARIZONA - Very heavy in many untreated backyard vegetable plantings in Phoenix area, Maricopa County; one garden turned under. (Ariz. Coop. Sur.). OKLAHOMA - Light on spinach in Tulsa County. (Okla. Coop. Sur.).

DECIDUOUS FRUITS AND NUTS

GLOBOSE SCALE (Lecanium prunastri) - MARYLAND - Collected on plum by R. D. Gordon at Silver Spring, Montgomery County, May 4, 1967. Det. by R. F. Wilkey. This is a new State record. Collected on peach by W. T. Garrett at Parkville, Baltimore County, June 20, 1967. Det. by R. F. Wilkey. This is a new county record. (U. Md., Ent. Dept.).

SAN JOSE SCALE (Aspidiotus perniciosus) - TEXAS - Damaged apple trees near Bowie, Montague County. (Randolph).

OYSTERSHELL SCALE (Lepidosaphes ulmi) - IOWA - Eggs on twigs of fruit trees in Oran, Fayette County. (Gunderson).

WOOLLY APPLE APHID (Eriosoma lanigerum) - ALABAMA - Infested 65 percent of trees in 2-year-old apple orchard in Chambers County. (Bagby et al.).

AN APHID (Monelliopsis tuberculata) - UTAH - Collected on leaves of black walnut trees in Salt Lake, Millard, Cache, and Weber Counties from June to August 1966 by G. F. Knowlton. Det. by C. F. Smith. (Roberts).

CITRUS

CITRUS RED MITE (Panonychus citri) - CALIFORNIA - Moderate on lemon trees and fruit in Ramona, San Diego County. (Cal. Coop. Rpt.). ARIZONA - Infestations spread to edge of Yuma Mesa and west to Avenue "B" in Yuma County. (Ariz. Coop. Sur.).

CALIFORNIA RED SCALE (Aonidiella aurantii) - CALIFORNIA - Moderate on citrus in Lindsay, Tulare County. (Cal. Coop. Rpt.).

GLOVER SCALE (Lepidosaphes gloverii) - FLORIDA - Infested stems of hardy orange, Poncirus trifoliata, at nursery in Pomona Park, Alachua County, January 29. (Graham). This is a new Florida Department of Plant Industry host record. (Fla. Coop. Rpt.).

ORNAMENTALS

WESTERN PEACH TREE BORER (Sanninoidea exitiosa graefi) - CALIFORNIA - Heavy in flowering plum trees in Gilroy, Santa Clara County. (Cal. Coop. Rpt.).

AN ARMORED SCALE (Pseudaonidia paeoniae) - ALABAMA - Major pest on several thousand camellia plants in Jefferson County and problem in Mobile County. (Seibels et al.).

A CONIFER APHID (Cinara tujaefilina) - OKLAHOMA - Infesting arborvitae in Payne County. (Okla. Coop. Sur.). ARIZONA - Heavy on arborvitae at Safford, Graham County. (Ariz. Coop. Sur.).

FOREST AND SHADE TREES

NANTUCKET PINE TIP MOTH (Rhyacionia frustrana) - OKLAHOMA - Adult emergence near 10 percent in pine plantations in McCurtain County. (Okla. Coop. Sur.).

CALIFORNIA OAKWORM (Phryganidia californica) - CALIFORNIA - Young larvae and pupae moderate on oak leaves in Fallbrook, San Diego County. (Cal. Coop. Rpt.).

A BARK BEETLE (Phloeosinus cupressi) - CALIFORNIA - Moderate on cypress trees in Paso Robles, San Luis Obispo County. (Cal. Coop. Rpt.).

A PLATYPODID BEETLE (Platypus quadridentatus) - FLORIDA - Larvae, pupae, and adults heavy in decayed bluejack oak at Gainesville, Alachua County, February 2. Det. by L. A. Hetrick. Species rare in State. (Fla. Coop. Sur.).

MAN AND ANIMALS

SCREW-WORM (Cochliomyia hominivorax) - No cases reported in U. S. February 11-17, 1968. Total of 33 cases reported in portion of Barrier Zone in Republic of Mexico as follows: Territorio sur de Baja California 20, Sonora 3, Chihuahua 1, Tamaulipas 9. Total of 3 cases reported in Mexico South of Barrier Zone. Barrier Zone is area where eradication operations underway to prevent establishment of self-sustaining population in U.S. Sterile screw-worm flies released: Texas 168,000, Mexico 86,326,000. (Anim. Health Div.).

COMMON CATTLE GRUB (Hypoderma lineatum) - OKLAHOMA - None found on cattle in Oklahoma County packing plant. (Okla. Coop. Sur.).

MOSQUITOES (Culex spp.) - MISSISSIPPI - Larvae and eggs found in still water on warm days in Oktibbeha County. (Dinkins).

CATTLE LICE - ARIZONA - Heavy on few head of beef cattle moved into Maricopa County from Coconino and Yavapai Counties. (Ariz. Coop. Sur.). OKLAHOMA - Haematopinus eurysternus ranged 100-250 per 6-square-inch area on neck region of 20 percent of cattle at Oklahoma City packing plant. (Okla. Coop. Sur.). ARKANSAS - Linognathus vituli increasing with heavy infestations in some herds in northwest area. Dominant louse on cattle in area. H. eurysternus increased in same area. (Simco).

BROWN RECLUSE SPIDER (Loxosceles reclusa) - INDIANA - Male collected in house in Bloomington, Monroe County. Det. by F. N. Young. (Huber).

NORTHERN FOWL MITE (Ornithonyssus sylviarum) - ARKANSAS - Increased in northwest area; heavy in some flocks. (Simco).

TROPICAL RAT MITE (Ornithonyssus bacoti) - TEXAS - Annoying occupants of office building at Edna, Jackson County. (Wilson).

HOUSEHOLDS AND STRUCTURES

EASTERN SUBTERRANEAN TERMITE (Reticulitermes flavipes) - MARYLAND - Damage heavy to house flooring in Hyattsville, Prince Georges County. (U. Md., Ent. Dept.).

STORED PRODUCTS

DERMESTID BEETLES - CALIFORNIA - Larvae of Trogoderma parabile, T. simplex, and Anthrenus sp., heavy in trogotraps in several warehouses and feed mills in Chico, Butte County. (Cal. Coop. Rpt.).

POTATO TUBERWORM (Phthorimaea operculella) - PENNSYLVANIA - Moderate on several thousand bushels of stored potatoes in Blair County; serious problem with many shippers. (Gesell).

BENEFICIAL INSECTS

BROWN LACEWINGS (Hemerobius spp.) - OKLAHOMA - Adults active in pine trees in Pushmataha County. (Okla. Coop. Sur.).

CONVERGENT LADY BEETLE (Hippodamia convergens) - OKLAHOMA - Active on pine trees in McCurtain County. (Okla. Coop. Sur.).

FEDERAL & STATE PLANT PROTECTION PROGRAMS

PINK BOLLWORM (Pectinophora gossypiella) - ARIZONA - Rains for past week slowed down plowing up of cotton stalks throughout State. This is shortening host free period. Many acres remain as carryover menace. (Ariz. Coop. Sur.).

HAWAII INSECT REPORT

Vegetables - MELON FLY (Dacus cucurbitae) larvae heavy in 25 percent of cucumbers in 0.25-acre planting in Waimanalo, Oahu; many fruits damaged due to oviposition. (Funasaki). IMPORTED CABBAGEWORM (Pieris rapae) eggs heavy in one acre of cauliflower in upper Omaopio at 2,300 feet elevation and eggs light in 7 acres of cabbage in upper Kula at 3,600 feet on Maui. Larvae and adults trace in both areas. CABBAGE LOOPER (Trichoplusia ni) eggs heavy and larvae medium on acre of cauliflower and 1.5 acres of cabbage in upper Omaopio, Maui. (Miyahira). GREENHOUSE WHITEFLY (Trialeurodes vaporariorum) heavy in some snap beans, yard-long beans, bittermelon, and seequa, Luffa acutangula, at Pupukea, Oahu; spray operations hampered by unfavorable weather. (Funasaki). SPOTTED GARDEN SLUG (Limax maximus) and VARIEGATED CUTWORM (Peridroma saucia) damage heavy in backyard cabbage plantings in Makawao, Maui; L. maximus damage light on strawberries in same plantings. (Miyahira).

Fruits - MEDITERRANEAN FRUIT FLY (Ceratitis capitata), MELON FLY (Dacus cucurbitae) ORIENTAL FRUIT FLY (Dacus dorsalis) - On Hawaii from September to November 1967, large samplings of wild momordica (7,503 fruits) from Honomalino (1,700 feet) produced an infestation index of 375 D. cucurbitae larvae per pound of fruit; Jerusalem cherry (21,922 fruits) from Mauna Loa Truck Trail (4,250 feet) produced an index of 425 C. capitata larvae per pound of fruit. Samplings of coffee (1,350 fruits) yielded 22.7 C. capitata larvae per pound of fruit. Smaller samplings of guava and jocote corona (Spondias purpurea) and jocote Costa Rica yielded 2.3, 7.0, and 8.0 D. dorsalis larvae per pound of fruit, respectively. Parasitization rates were 14.8 percent by Opius fletcheri in wild momordica and 7.8 percent by O. tryoni in Jerusalem cherry. Tetrastichus giffardianus also recovered in good numbers from momordica. Parasitism in other fruits predominantly by O. oophilus. (USDA, ARS, Haw. Fruit Fly Investigations).

Ornamentals - All stages of a PLATASPID BUG (Coptosoma xanthogramma) medium on jade vine, Strongylodon macrobotrys, around museum in Lihue, Kauai; damage not extensive. (Sugawa). All stages of COTTONY-CUSHION SCALE (Icerya purchasi) generally light to medium, severe in spots, on foliage and stems of maunaloa vines in Waimanalo, Oahu, for a new host record. (Funasaki, Hale).

Shade Trees - All stages of CUBAN-LAUREL THRIPS (Gynaikothrips ficorum) increased slightly on terminal leaves of Chinese banyan throughout Oahu. Nymphs and adults of a predaceous ANTHOCORID BUG (Montandoniola moraguesi) very common in curled, thrips-infested leaves. (Funasaki).

Beneficial Organisms - A PARASITID MITE (Parasitus sp.) heavy in harvested celery field in Kameula, Hawaii Island. This mite is predaceous on immature insects in decaying organic matter. Det. by F. H. Haramoto. (Nakano). A SCELIONID WASP (Trissolcus sp.) parasitized numerous eggs of a PLATASPID BUG (Coptosoma xanthogramma) in several areas on Oahu and at Hilo, Hawaii Island. Percent parasitism of 100 or more egg clusters was 38 in Honolulu, 76 in Aiea, 95 in Kaneohe, 80 in Waimanalo, 50 in Waiahole, and 70 percent in Hilo. (Au, Yoshioka).

Miscellaneous - VAGRANT GRASSHOPPER (Schistocerca vaga) female taken on tomato plant at Koko Head, Oahu; first specimen found on southeast end of island. (Mitchell).

INSECT DETECTION

New State Record

GLOBOSE SCALE (Lecanium prunastri) - MARYLAND - Collected on plum at Silver Spring, Montgomery County, May 4, 1967, by R. D. Gordon. Det. by R. F. Wilkey. (P. 92).

New County Records

GLOBOSE SCALE (Lecanium prunastri) - MARYLAND - Baltimore County. (p. 92).

GLOVER ROOT BORER (Hylastinus obscurus) - WASHINGTON - Franklin County. (p. 92).

WESTERN BEAN CUTWORM (Loxagrotis albicosta) - NEBRASKA - Boone, Boyd, Frontier, Furnas, Hitchcock, Howard, Merrick, Nance, Phelps, and Red Willow Counties. (p. 109).

NORTHERN CORN ROOTWORM (Diabrotica longicornis) - ALABAMA - De Kalb County. (p. 110).

LIGHT TRAP COLLECTIONS

FLORIDA - Gainesville - 2/6-8, BL - Black cutworm (Agrotis ipsilon) 3, cabbage looper (Trichoplusia ni) 2, granulate cutworm (Feltia subterranea) 22, yellow-striped armyworm (Prodenia ornithogalli) 1. TEXAS - Brownsville - 2/8-16, 2BL, 45-74°F, precip. 0.61 - Armyworm (Pseudaletia unipuncta) 38, black cutworm 111, cabbage looper 4, granulate cutworm 61, salt-marsh caterpillar (Estigmene acrea) 5, tobacco budworm (Heliothis virescens) 1, variegated cutworm (Peridroma saucia) 71, yellow-striped armyworm 24.

CORRECTIONS

CEIR 18(7):81 - A SLUG (Limax sp.) - HAWAII - Change to GRAY FIELD SLUG (Deroceras laeve). (Funasaki).

WEATHER BUREAU'S 30-DAY OUTLOOK

MID-FEBRUARY TO MID-MARCH

The Weather Bureau's 30-day outlook is for temperatures to average below seasonal normals east of the Rockies except for near normal in New England. Above normal temperatures are indicated for the West Coast and also most of the Great Basin while near normal temperatures are expected in unspecified areas. Precipitation is expected to exceed normal over the gulf and south Atlantic coast regions as well as northern New England and much of the Southwest. Subnormal totals are indicated for the Pacific Northwest and also for the upper and middle Mississippi Valley and the Ohio Valley. Elsewhere near normal precipitation is expected.

Weather forecast given here is based on the official 30-day "Resume and Outlook" published twice a month by the Weather Bureau. You can subscribe through the Superintendent of Documents, Washington, D. C. 20250. Price \$5.00 a year.

SUMMARY OF INSECT CONDITIONS IN THE UNITED STATES - 1967

INTRODUCTION

The summary of insect conditions, beginning in this issue, will be continued in several succeeding issues of the Cooperative Economic Insect Report. This was compiled in Survey and Detection Operations from annual summaries that were submitted by various State and Federal cooperators. A list of the individuals who assisted in assembling data, as well as a summary of the weather for 1967, will appear after the last section of this summary is published. Survey and Detection Operations appreciates the assistance of all individuals who have participated in the preparation of material for the 1967 Summary.

SPECIAL INSECTS OF REGIONAL SIGNIFICANCE

Highlights

ARMYWORM damaged cereal crops in Pennsylvania, Delaware, Maryland, Virginia, and Illinois. Populations on various grasses were the heaviest since 1962 in Alabama and the situation proved serious in sweet corn on Long Island, New York. CORN EARWORM numbers and damage were generally light with spotted heavy infestations on various crops in most of the States. Controls were applied where the infestations and damage were the heaviest. TOBACCO BUDWORM was the major pest of tobacco in Florida and of cotton in Alabama. CORN LEAF APHID populations and damage were the heaviest ever recorded in Indiana and populations were the heaviest in recent years on the Eastern Shore of Maryland. GREENBUG was heavy on small grains over short periods in Oklahoma, Texas, Missouri, and South Dakota, but SPOTTED ALFALFA APHID was generally light and noneconomic in most reporting States. POTATO LEAFHOPPER numbers and damage were heavy on alfalfa in most reporting States and was a major pest of beans in Upstate New York. BEET LEAFHOPPER populations on sugarbeets required controls in California. ASTER LEAFHOPPER damaged lettuce in Wisconsin and controls were effective on vegetables in Michigan.

ARMYWORM (*Pseudaletia unipuncta*) adults in blacklight traps at Monmouth, MAINE, indicated a very strong flight which continued well into July. Possibly because of excessive moisture, larval activity was very low. Armyworm was serious in many sweet corn plantings on Long Island, NEW YORK. In the southwest quarter of PENNSYLVANIA, armyworm infested barley, oats, and wheat during late June and early July. Control measures were needed to save many fields. Damage was heaviest to barley and lightest on corn. Corn and small grains were damaged in some areas of DELAWARE. Larvae were observed feeding on cantaloup in a field in southern Sussex County where treatment was required. Populations in MARYLAND were above normal during the spring and heavily damaged wheat, barley, and corn, especially on the Eastern Shore. Second-generation larvae caused above normal damage to maturing field corn in Wicomico and Worcester Counties. Adult flights were observed during May in VIRGINIA. Some larval infestations of barley and corn required control in early June in the northern area.

Armyworm larvae appeared in economic numbers in OHIO in mid-June. By the end of June, most damage was to corn but wheat and timothy were also damaged in 16 widespread counties. A large adult flight occurred the first 2 weeks of July. Second-generation larvae were not as damaging as those of the first generation, but some damage to late-maturing corn occurred in August. In INDIANA, armyworm caused localized heavy damage to wheat, corn, and grass pastures during the period June 12-22. Most infestations occurred in the west-central district and in north-central La Porte County. Although no general outbreak occurred, populations were heavier than in 1966. In the first week of May in WISCONSIN,

overwintering moths were active and first-generation larvae became common in a few early, grassy pea fields. By mid-July, first-generation moths were numerous. No crops were damaged but some feeding was noted. Larval populations in ILLINOIS ranged 0-9 per linear foot of row in wheat, reached 15-20 per foot in lodged areas, and averaged 30 per foot in 2 barley fields. Some migration to corn occurred. Controls were applied to an estimated 115,624 acres.

Armyworm infestations on Coastal Bermuda grass and other grasses were the heaviest since 1962 in ALABAMA. Damage occurred at several locations and extended to the extreme northern part of the State. Populations were lighter than normal in ARKANSAS. Larvae ranged 2-4 per square foot in a few fields of wheat in late April. The first armyworm larvae of the season in MISSOURI were collected in the southeastern area the week ending April 15. Counts in the area remained low until mid-May. By late May moderate to high populations of 1-14 larvae per square foot infested rank barley and wheat. Since up to 75 percent of the larvae were parasitized, chemical controls were not needed. In the north-central area infestations were scattered and heavy (3-35 larvae per square foot) in early June. Light populations of 0-4 per square foot occurred in northern Missouri. No economic buildup occurred in IOWA. Small numbers of adults were collected throughout the season in light traps and larvae were collected in mid-June on bromegrass.

Armyworm was very light on corn and sorghum in NEBRASKA. Damage in KANSAS was light to moderate in a few wheat fields in the northeast and east-central areas during June. Controls were applied in some areas. Larvae fed in the whorls of grain sorghum in Moore County, TEXAS. Armyworm was very abundant on corn and sorghum throughout the year in CALIFORNIA. Local damage occurred on some grain crops early in the season. Armyworm also damaged some lawns and irrigated pastures in California.

CORN EARWORM (*Heliothis zea*) was widespread on corn and sorghum from June into December in CALIFORNIA but was not as damaging as in 1966. Infestations were very widespread on a wide range of vegetables. In IDAHO, damage was first observed July 5 on sweet corn tassels still in the leaf whorls in gardens near Parma. By July 28, larvae were prevalent on sweet and field corn tassels in Canyon County. The more heavily infested fields were severely injured. By August 11, virtually all ears were infested in some fields, while in others egg counts ranged 0-4 and averaged 2 per silk. By harvest, this pest had infested all hybrid sweet corn. Seed losses ranged 20-50 percent. Corn earworm damage in UTAH was variable. In the northern area, much canning corn was aerially treated. In general, damage ranged from normal to light in some areas but was severe in Washington County. In ARIZONA, heavy infestations on lettuce in Yuma County required controls in late March. Larvae on corn and sorghum ranged light to heavy, from early February to early October in the Yuma Valley. Numbers were heavy in mid-June in Maricopa County and during June and July in Pinal County. Repeated controls were common. Damage ranged moderate to heavy on corn in Yavapai and Graham Counties but no controls were applied. In early September, light numbers of corn earworm larvae infested alfalfa, and by mid-October numbers were moderate in Cochise, Maricopa, Pinal, and Yuma Counties. Corn earworm was serious on sweet corn and field corn in most areas of NEW MEXICO, except in properly treated fields. Light populations in COLORADO caused little loss to corn. Corn earworm was heavy on sweet corn in the Hingham area of MONTANA. Infestations occurred in other areas of the State, but the pest was not distributed in as many areas as usual.

For the second consecutive year, August and September weather prevented the usual late summer corn earworm adult flight into MICHIGAN from the south. Blacklight traps captured only a very few specimens in southern counties the third week of September. A male captured at a Livingston County light on March 31 represents the earliest seasonal collection ever made in the State. Larvae were not a problem. Corn earworm infestations in corn were very light in INDIANA. The State average of 3.5 percent was a slight increase over 1966. The southern quarter of the State had an infestation of 10.9 percent with the

northern three-quarters receiving very little damage. Light traps caught trace numbers of adults throughout the State. In ILLINOIS, however, numbers were down compared with past years. The first generation began with a normal increase which soon declined. Second-generation populations were far below normal. The earliest corn earworm moths ever caught in MISSOURI were trapped on April 10 at Portageville, New Madrid County. Larval feeding in corn whorls occurred in scattered areas. Numbers were higher in 1967 than in 1966. Corn earworm populations remained low in IOWA during 1967 and little damage was reported. In NEBRASKA, numbers were very light except on late corn in the southeast. It was no problem on sorghum. In most areas of KANSAS, numbers on field corn continued low for the second year, but in the south-central, east-central, and northeastern areas, particularly, economic numbers damaged some sweet corn. In the southeast district, some sorghum heads were damaged in August. Populations were very light on soybeans and alfalfa and caused no damage. Corn earworm moths were first noted on alfalfa in southwestern OKLAHOMA in mid-April. Moderate to heavy numbers built up during June, July, and August in the central, south-central, and east-central areas. Corn and grain sorghums were most heavily damaged, but larvae also occurred in alfalfa and peanuts. Activity continued through late October in isolated fields. Corn earworm caused unusually heavy damage to corn and grain sorghum in central and southeastern TEXAS. Light to moderate numbers occurred in most sections except for the upper High Plains. Corn earworm larvae damaged grain sorghum, corn, tomatoes, peanuts, and Coastal Bermuda grass. In ARKANSAS, first larvae in sorghum heads were found July 20 in the southwest area. Populations were noneconomic throughout the season with economic numbers occurring in only a few fields. Although normally the number one pest in the State, corn earworm was very light with few soybean or okra fields needing treatment.

Corn earworm was widespread and damaging to pretassel corn and sorghum and to ear corn in the milk and dough stages in ALABAMA. Late generations were serious on peanuts, soybeans, cotton, tomatoes, and other crops. Corn earworm was one of the major pests of soybeans in southern Alabama but was less serious in the central and northern areas. Damage was less in 1967 than in 1966. Larvae were serious on tobacco but were controlled by growers. In FLORIDA, corn earworm comprised about 1.5 percent of the larvae infesting ears of sweet corn during the fall and was less numerous than the fall armyworm during the spring. In ears harvested in late May, H. zea comprised only 30 to 45 percent of the population. At Sanford, low populations on spring sweet corn caused little or no loss due to a 24-hour control program. Corn earworm was heavy on fall cabbage planted in or near fields with corn cover crops at Hastings. Controls were unsuccessful since larvae tunneled into the heads. Corn earworm and fall armyworm caused the worst problem in memory on sweet corn in areas of Orange County, Florida. Corn earworm, as part of a noctuid complex, was involved in a severe infestation on soybeans. This pest and tobacco budworm caused little damage to watermelons in Lake County because of an early fruit set and ripening.

Corn earworm was light to medium on corn in central VIRGINIA in July with heavy damage in some fields. Infestations were light on soybeans and peanuts throughout 1967. Larvae caused much damage to late sweet corn, fall beans, late tomatoes, peppers, and broccoli on the Eastern Shore of Virginia. Corn earworm populations in MARYLAND were below normal on corn and soybeans, except for heavy ear infestations in late maturing corn. Moth flights were late in DELAWARE and larval injury was below normal on corn and light on soybeans. Corn earworm damaged sweet corn throughout NEW JERSEY. It was particularly heavy late in the season. At that time, damage from the light numbers infesting lettuce was minimized by repeated control applications in the southern counties. Populations and injury were very light on beans and celery in New Jersey. Corn earworm was a minor problem on sweet corn on Long Island, NEW YORK. No larvae were found in corn tassels in June, but were found in the ears on July 18 in the Hudson Valley. There, larvae were scarce until September and early October when up to 25 percent of the ears in untreated plantings were infested. Populations were the lowest in 17 years of local observations. In western New York, only one fifth instar was detected in more than 1,000 ear tips examined in untreated corn grown for processing. Corn earworm was more damaging in RHODE ISLAND than

for the past several years. Corn earworm caused some severe damage in scattered areas of MAINE, but infestations and damage generally ranged light to moderate.

Early instars of TOBACCO BUDWORM (Heliothis virescens) in FLORIDA ranged 1-3 per tobacco plant on several hundred plants examined in Alachua County on April 13. Larvae were moderate to heavy on newly set flue-cured tobacco in Lafayette County in early April and were severe from middle to late April over most of Hamilton County. During late April and early May, this pest was serious at Live Oak, Suwannee County, and continued serious throughout May in the flue-cured tobacco district of north Florida. Tobacco budworm was the major pest of tobacco during 1967. It accounted for 4.3 of the 7.6 percent loss due to insects. Insect losses were estimated at \$930,696. Losses due to insects in 1968 are expected to be 6-8 percent of the crop value. Infestations will probably remain as heavy as in 1967 with a slight decrease due to grower awareness and preparedness. In ALABAMA, damaging numbers of tobacco budworm occurred in mixed populations with corn earworm on crimson clover, vetch, peanuts, and soybeans. From these crops, movement was heavy to cotton, corn, sorghum, field peas, and beans. Although not as heavy as in 1966, tobacco budworm was a major pest of cotton throughout Alabama. Controls were difficult in the northern area due to rains. Intensive efforts by growers kept these pests under control on tobacco. Tobacco budworm was more prevalent in CALIFORNIA and damaged a wider variety of ornamentals.

ARMY CUTWORM (Chorizagrotis auxiliaris) damaged several alfalfa fields during the spring in Yellowstone County, MONTANA. Populations were economic in 7 southwestern counties. In IDAHO, larvae were abundant and damaged newly seeded and established alfalfa fields in Nez Perce, Canyon, Jefferson, Lemhi, and Washington Counties during May. Populations in new stands ranged 1-15 per linear foot of row and in old stands, as high as 16 larvae per plant. By May 8, third instars comprised 80 percent of the population in Washington County. Populations on alfalfa in NEVADA were light in March in Pershing County, developed to medium levels by early April in Lyon County, and became heavy in early June in Humboldt County. Damage in UTAH was spotty in the spring. Eight hundred acres of alfalfa in western Wayne County did not grow until controls were applied. Injury was below average. This cutworm and other species damaged dry-land wheat in the Blanding and Bug Point areas of San Juan County; elsewhere, damage was local. Army cutworm populations required control in some eastern areas of COLORADO but wheat loss was light. Populations in NEBRASKA were very light on wheat in the panhandle area and were generally below economic levels on legumes. In KANSAS, infestations reached economic levels in many wheat fields in the south-central, central, and north-central areas in March. Populations ranged up to 30 per square foot in Cowley County. Many fields were treated. Light numbers infested wheat in central and north-central OKLAHOMA during February.

Since TOBACCO HORNWORM (Manduca sexta) was not specifically controlled in many fields, populations were about normal on tobacco in southern MARYLAND. Black-light traps in VIRGINIA captured few moths. In FLORIDA, tobacco hornworm was very scarce on flue-cured tobacco but was increasing on shade-grown tobacco. Light trap catches showed a 77-percent increase in 1967 compared with 1966. Egg deposits in several flue-cured tobacco fields indicated that a strong buildup of hornworms began early in the season. This hornworm did not damage cigar-wrapper tobacco, but a slight problem on flue-cured tobacco occurred in Lafayette County. Tobacco hornworm was light in most areas of OKLAHOMA and noted on tomatoes during August and September. This pest was widespread in CALIFORNIA with varied populations on tomatoes.

TOMATO HORNWORM (Manduca quinquemaculata) was light in most areas of OKLAHOMA and KANSAS. Light damage to tomatoes occurred in northeastern Kansas. This pest was again very common in RHODE ISLAND.

MELONWORM (Diaphania hyalinata) and PICKLEWORM (D. nitidalis) were serious on cucumbers and cantaloups in ALABAMA. Pickleworm increased to economic levels on cucurbits by late April and early May at Belle Glade, FLORIDA. Melonworm also infested cucurbits at the same time in the area.

CORN LEAF APHID (Rhopalosiphum maidis) was inconspicuous in RHODE ISLAND. This aphid was of minor concern on sweet corn on Long Island, NEW YORK, but was abundant on sweet corn in the Hudson River Valley in midsummer. Addition of an aphidicide to some programmed treatments gave some control. Lady beetles were not numerous in treated or untreated fields. Aphids and sooty fungus on husks were problems to the end of the season in New York. In NEW JERSEY, high numbers infested sweet corn plantings throughout the season and injury was very noticeable. Aphids on the flag leaves and husks reduced the market value. In PENNSYLVANIA, populations were widespread but light in many corn fields. Injurious levels were not reached. Corn leaf aphid was statewide in DELAWARE and was very heavy in some areas. On the Eastern Shore of MARYLAND, populations during July and August were the heaviest in recent years. As predators did not control this pest, ear development was retarded.

The first corn leaf aphids of the season in OHIO occurred in young field corn in Ross County on June 28. By mid-July, populations were just becoming established statewide. Numbers were never large enough to interfere with pollination. Most corn was beyond the susceptible stage before damage could occur. The threat decreased in mid-July with the beginning of tassel emergence. Infestations were heaviest when tassel emergence was late. Damaging or moderate to heavy populations infested up to 60 percent of plants in some late corn. By early August, most corn had silked and was no longer susceptible to damage. Populations remained in moist places on corn in August or until drying occurred. In INDIANA, the heaviest infestations and damage ever recorded occurred during 1967. On a statewide basis, light infestations of 30.3 percent were very similar to those in 1966. However, the percent of moderate and severe infestations more than doubled for 1967 compared with that of 1966. Moderate and severe infestations increased the most in the northern three-quarters of the State but decreased in the southern quarter. Adult and nymphal colonies in MICHIGAN infested a high percentage of fields throughout the corn-growing area during August. Timely rains minimized injury in most locations. Overall damage was much less severe in 1967 than during 1966 and other drought years. Corn leaf aphid colonies became evident in the whorls of corn in WISCONSIN in mid-July. Because colonies of 500 or more aphids per plant were uncommon, lady beetles, flower flies, and diseases apparently controlled them. In mid-August, alates appeared and dispersal began. Populations in ILLINOIS were extremely low compared with 1966, the year of the most severe infestations on record in the State. A moderately infested field was rare.

In ARKANSAS, this aphid heavily infested sorghum. Some fields were treated in late July in the southwestern area. High numbers occurred throughout ALABAMA, especially in the northwestern area. This increase may have been a factor in maize dwarf mosaic being more general in the northwest area. Corn leaf aphid occurred in most sections of TEXAS, with heaviest populations in Brazos, Lee, Waller, Ft. Bend, and Brazoria Counties. Johnson grass, Sudan grass, corn, and grain sorghum were damaged. In OKLAHOMA, moderate to heavy numbers infested small grains, corn, and sorghum through late September in the north-central, central, south-central, east-central, and southwest areas. Activity was noted up to mid-December. This aphid caused no problems on corn and sorghum in KANSAS. In NEBRASKA, heavy populations caused some damage to sorghum in mid-July. On corn, a gradual buildup in July continuing into August caused no serious losses. Although corn leaf aphid infested most corn in SOUTH DAKOTA, populations in 1967 declined from those of 1966. Late corn in the eastern area retained higher populations into the fall in 1967 than in 1966. Colonies occurred on corn tassels but were not economically important in NORTH DAKOTA. Light to heavy numbers infested most barley fields and some wheat fields in eastern and southwestern NEW MEXICO.

In ARIZONA, heavy numbers infested small grains in Maricopa, Yuma, Pinal, Pima, Cochise, and Graham Counties during April. Controls were required in some barley, wheat, and milo fields. Corn leaf aphid infestations on corn in UTAH were general but light. Several hundred acres of barley were damaged in the northern area. In NEVADA, heavy infestations developed and required controls in Churchill and Pershing Counties in late June and July. Corn leaf aphid was light to medium in other areas of the State and was generally held in check by predators and parasites.

GREENBUG (*Schizaphis graminum*) was not noted in Everglades pastures during the fall in FLORIDA. It infested small grains throughout ALABAMA. Infestations requiring controls were reported mainly in coastal counties, especially Mobile and Baldwin. It began increasing in ARKANSAS in early February. Only a few fields became economic. Activity in OKLAHOMA was first noted on wheat checked in Tillman and Kiowa Counties in early January. In February, a buildup started statewide. From mid-March to early April, counts in isolated fields of Major and Logan Counties ran 2,000 to 5,000 per linear foot. By mid-April, numbers had decreased sharply until none were reported. In mid-September, fall activity began in the central area. Throughout November, light numbers infested most fields. In December, heavy numbers (50-150 per foot) infesting wheat in south-central and southwestern Oklahoma indicate possible problems in 1968. Due to widespread drought in TEXAS early in the year, greenbug was very light in small grains in late winter and early spring. From late November through December, cool temperatures apparently favored development of greenbug but not of predators and parasites. Heaviest infestations occurred in counties southeast and southwest of Amarillo. Some control was required in the Panhandle, the north-central area, and other localized areas throughout Texas. Greenbug apparently built up in NEW MEXICO wheat fields in Roosevelt and Curry Counties during the fall. Damage was noticeable in some fields.

During spring in KANSAS, this pest remained noneconomic on wheat. During the fall, moderate to heavy numbers damaged some isolated early wheat in the western third of the State. A large acreage was sprayed. High populations (63-5,000 per foot of row) of this aphid and apple grain aphid infested small grains and grasses in southern MISSOURI from late March to mid-April. Most of the damage occurred on barley and orchard grass. In IOWA, light numbers caused light damage to small grains. Populations during the spring in NEBRASKA caused no damage, but in the fall caused a nearly complete loss of stand in some early sown winter wheat in the central area. Large acreages were treated. Economic losses occurred in 6 central and 3 northeastern Nebraska counties. In SOUTH DAKOTA, an unusual outbreak occurred in mid-September on winter wheat in the south-central area, particularly in the northern third of Tripp County and in portions of Bennett, Brule, and Charles Mix Counties. Up to 500 per seedling or at least 2,500 aphids per linear foot of row infested some good stands in early planted fields. In the first week of October, wheat was 3 to 4 inches high with 10 to 12 seedlings per foot in good stands. By the beginning of November, greenbug populations had decreased but were still active in spite of 20 degree temperatures. Crop loss ranged up to 100 percent in portions of some fields. Experimental spraying was done on a small acreage of winter wheat near Winner, Tripp County. In mid-October, greenbugs from heavily infested fields in Tripp County were negative for barley yellow dwarf virus. In NORTH DAKOTA, generally light greenbug colonies infested lower leaves along with English grain aphid and *Rhopalosiphum padi*. Greenbug moved into MINNESOTA on strong southerly winds on April 14, much earlier than normal. Generally low numbers caused very few problems and generally did not threaten small grains. On April 19, alates were detected on grass and rye in WISCONSIN. Through May and June, populations averaged 1 per 10 sweeps in oats. The oats headed before any significant "red leaf" problems developed.

SPOTTED ALFALFA APHID (Therioaphis maculata) ranged 2-5 per sweep in the Hermiston area of Umatilla County, OREGON, in September. Infestations were generally light and spotty in CALIFORNIA, but were locally heavy in some areas. Populations were below 1966 levels with no economic infestations in NEVADA. By mid-September in IDAHO, spotted alfalfa aphid averaged 100 per sweep in established alfalfa fields near Parma. Several seedling fields required control in the Parma and Marsing areas. This was the first time in several years that populations have reached this magnitude. Damage was light and less widespread in Millard County, UTAH, than during the severe outbreak in 1966.

Spotted alfalfa aphid was light in Maricopa and Yuma Counties, ARIZONA, during the early part of 1967 and in Cochise County during mid-1967. Populations built up again on alfalfa at the end of the year in Maricopa, Pinal, and Yuma Counties. Light to heavy spotty infestations occurred in most alfalfa-growing areas of NEW MEXICO. Light populations in COLORADO caused some losses in newly seeded alfalfa fields. In SOUTH DAKOTA, low endemic numbers of spotted alfalfa aphid, less than 5-10 per 100 sweeps, occurred in June and July. Up to 100 per 100 sweeps infested the few fields which had over 1,000 pea aphids per 100 sweeps. Spotted alfalfa aphid was found for the first time in McPherson, Walworth, and Potter Counties in July. It has not become economically important in South Dakota. Spotted alfalfa aphid appeared in NEBRASKA on May 5 on alfalfa in Saunders and Lancaster Counties. Numbers remained well below economic levels. Weather and predators in KANSAS apparently kept this aphid below economic levels during the summer. In OKLAHOMA, moderate to heavy infestations damaged isolated alfalfa stands in most areas throughout 1967. Young alfalfa stands were more seriously damaged than old, established stands. In ARKANSAS, dead aphids were observed following -3°F. weather in January. Numbers built up in late March, but few economic infestations occurred.

Spotted alfalfa aphid built up in the extremely dry north-central and northeastern areas of INDIANA during mid-August. Counts ranged 8-32 per sweep, but in one spot east of Goshen, Elkhart County, populations averaged 250 per sweep on 8-inch alfalfa. Trace numbers were noted in Rock County, WISCONSIN, in early May. Populations increased slowly until late July when a marked increase occurred. Up to 300 per sweep were noted in some southern sand areas. Late in July, spotted alfalfa aphid averaged 10 per sweep in 6 south-central counties. Late in August, heavy parasitism was evident. By late October, populations of this aphid were down to 2 per sweep. Populations remained widespread and low throughout alfalfa areas of MICHIGAN. Spotted alfalfa aphid was common in small fields of alfalfa at Gainesville, FLORIDA, during March.

POTATO LEAFHOPPER (Empoasca fabae) damaged beans in VERMONT. Infestations were severe on alfalfa throughout NEW YORK, especially in Jefferson, Oswego, Cortland, and Erie Counties. Crop and stand losses were heavy. Potato leafhopper was a major pest of beans, especially snap beans, in Upstate New York, but was easily controlled. Damage was heavy in a few fields where controls were not applied. In PENNSYLVANIA, this leafhopper caused as much damage to alfalfa as alfalfa weevil. Populations built up rapidly about mid-June and remained very high until September. In NEW JERSEY, injury was light to moderate on vegetables but more severe than during 1966. Numbers were extremely heavy on untreated commercial bean plantings in DELAWARE. Populations were above normal on alfalfa, beans, and potatoes in all sections of MARYLAND. During July and August, potato leafhopper ranged 100-200 per sweep in many alfalfa fields in Carroll and Frederick Counties. First adults of the season in VIRGINIA were collected in mid-May on alfalfa in Montgomery County. By late June, some nymphs were full grown. In August, up to 21 adults and nymphs had yellowed much of the alfalfa in Roanoke County.

In OHIO in late June, increasing numbers of potato leafhopper had stunted, yellowed, and reduced the feed value of alfalfa. Damage to the second growth continued to increase through early August. Up to 50 per sweep infested damaged fields. This pest and a lack of moisture during hot July days reduced yields of second-growth alfalfa across the State. At the end of the second cutting in early August, increased rainfall improved alfalfa conditions in general and damage subsided. Yellowing of third growth was much less severe during August and September. Although adequate controls were available, damage was unusually heavy due to the belief that lack of moisture was the only cause. Potato leafhopper adults averaged 2 per sweep on alfalfa in southern INDIANA during late May. By early June, nymphs ranged from 2 per 5 sweeps to 2 per sweep. During late July adults peaked at 5-20 per sweep. Potato leafhopper increased during late June in central and northern Indiana. By early July, numbers ranged 2-15 and averaged 5 per sweep. In mid-July, yellowing was moderate to severe on dry area alfalfa. Populations ranged 6-23 and averaged 13 per sweep.

First adults of the season in MICHIGAN were swept from alfalfa in Washtenaw County on June 12. On June 19 an average of 37 adults per 25 sweeps and a few nymphs were present in Livingston County. On June 25, potato leafhopper ranged 30-100 and averaged 60 per 10 sweeps in 6 Washtenaw County alfalfa fields. By the second week of July, potatoes were damaged in some areas but only lightly in well-sprayed fields. Although nymphs were very common on soybeans and navy beans in the Saginaw Valley area by July 24, timely rains reduced injury. During August and September, adults ranged 5-60 per 10 sweeps on alfalfa. Moisture reserves and hay removal averted serious losses in some fields.

Potato leafhopper adults appeared on alfalfa and potatoes during mid-June in WISCONSIN. In July lima beans were infested. Populations on alfalfa averaged 1 per sweep until mid-July when they increased markedly in some southern fields. This pest was controlled on commercial potatoes and lima beans. Early in August, up to 60 per sweep infested some alfalfa fields. Late in August, nymphs constituted a high percentage of the population. By late September, populations had dropped to 5 per sweep. Potato leafhopper populations of 5-10 per sweep damaged many alfalfa fields in ILLINOIS in June and early July. An average of 2 per sweep had also damaged soybeans. Heavy populations of 40-1,000 potato leafhoppers per 10 sweeps infested forage legumes during July in MISSOURI. Most of the damage occurred in the western and northern areas of the State.

BEET LEAFHOPPER (*Circulifer tenellus*) was light on sugarbeets in Maricopa and Pinal Counties, ARIZONA, during early January and in Graham County during early May. Numerous adults infested vegetables on the Wellton Mesa in Yuma County during mid-April; controls were applied. Overall in CALIFORNIA, surveys showed a very low incidence of curly top disease. A high infestation and disease rate occurred at a few locations near the breeding grounds. Sugarbeets required treatment in some areas. An aggregate of 163,953 acres of rangeland was treated during the spring, fall, and winter. Russian thistles were eliminated on 3,105 acres of range and 2,288 miles of ditchbanks and roads. The spread of beet leafhopper and disease on sugarbeets was lighter than normal due to the cold, late, stormy spring in UTAH. In IDAHO, March and April surveys indicated that overwintering adults had declined from 90 in 1966 to 22 per 100 square feet in 1967 in the combined range breeding areas. On May 23, the first new adults appeared in the Saylor Creek area, but not all the eggs laid by overwintering females had yet hatched. On June 2, rangeland and roadside areas with populations of 50-380 beet leafhoppers per 100 square feet were sprayed. This treatment involved about 6,000 acres of rangeland and 1,000 acres of roadsides. In WASHINGTON, beet leafhopper was abundant on sugarbeets by June and later on garden tomatoes in Yakima County.

ASTER LEAFHOPPER (Macrosteles fascifrons) caused little damage in OKLAHOMA although it was common on wheat in the central, north-central, and northwestern areas from October through December. Adults migrated into Richland County, NORTH DAKOTA, May 14-20, but did not reach economic levels. Aster leafhopper migrated into MINNESOTA on strong, southerly winds on April 14, two weeks earlier than in 1966. Populations were moderate during most of the season. Aster yellows damaged few crops. In WISCONSIN, adults were detected on grasses in Grant and Crawford Counties in early April. In mid-May, 4 percent of leafhoppers, a high percentage for so early in the season, carried aster yellows. Numbers did not significantly increase until the first of June when 30 per 100 sweeps were common. On June 14, heavy numbers migrated into lettuce fields. Populations in lettuce and the incidence of virus in the leafhoppers remained high well into August. Much spraying was done in lettuce fields. Adults of aster leafhopper were first collected very early in MICHIGAN, being found in wheat samplings on April 25 in Livingston, Ingham, and Washtenaw Counties. Adult numbers remained relatively low until the second week of June when a heavy migration entered the State. Aster yellows was apparent on Canada thistle in mid-June and was widespread by late June. A good spray program was effective on vegetables. Damage by aster leafhopper ranged light to moderate on vegetables in NEW JERSEY, but was more severe than during 1966. Although small grain plantings are limited in FLORIDA, this pest was common on rye, wheat, oats, and barley at Gainesville, Alachua County.

POTATO PSYLLID (Paratrioza cockerelli) necessitated controls in many potato fields in Yuma, Maricopa, and Pinal Counties, ARIZONA. Nymphs were active from late March through April. This psyllid caused very light damage to potatoes and tomatoes in UTAH. Large numbers appeared early in the season on Lycium sp. in COLORADO, but populations did not build up in field crops.

CORN, SORGHUM, SUGARCANE

Highlights

EUROPEAN CORN BORER populations were generally the same or slightly lower than those in 1966 in most States reporting. SOUTHWESTERN CORN BORER numbers were the heaviest on record in southeastern Missouri and the heaviest in 5 years in west-central New Mexico. BLACK CUTWORM damage was serious in Delaware, Virginia, and Florida. FALL ARMYWORM was damaging in many States. LESSER CORN-STALK BORER was more severe on field corn in northern Florida than in several years. CORN ROOTWORMS spread to new areas in Illinois, Missouri, Kansas, Wisconsin, and North Dakota. Controls were applied to large acreages in Illinois and South Dakota. WIREWORMS seriously damaged field corn in Nebraska and sweet corn in Florida. SORGHUM MIDGE was heavy on sorghum in areas of Missouri, Kansas, and Texas. CHINCH BUG was heavy and damaging in Oklahoma.

EUROPEAN CORN BORER (Ostrinia nubilalis) damage and infestations were generally spotty in MAINE with severe damage in a few areas. Egg laying was observed at Scarborough on July 21 and egg masses and newly hatched larvae were found in Alfred July 24. Infestations averaged 13.95 percent and larvae 20.7 per 100 plants in 13 VERMONT counties with heaviest numbers in Grand Isle, Franklin, Windsor, and Chittenden Counties. Levels were similar to those of 1966. Populations were more damaging than in several years in RHODE ISLAND. Numbers were moderate and damaging in most sweet corn plantings on Long Island, NEW YORK, with the major damage in the western area. Two broods were dominant in much of the western section, the Hudson Valley, and the more southern areas. Ear damage occurred on market and processing sweet corn and larvae were heavy in field and sweet corn stubble by the end of 1967. Numbers were unusually abundant, especially the second brood in September. Infestations in sweet corn increased to 50 and then 80 percent in the Hudson Valley, the highest level in 17 years. Controls

were good although 8-10 applications were required on whorl, green tassel, and silking stages. Stalk breakage ranged 10-95 percent in untreated fields after a windstorm in southern Monroe County. The second brood was the heaviest in the upstate area of New York in many years as parasitism was negligible. The first generation was moderate and the second generation was more abundant on sweet corn in NEW JERSEY than in 1966. European corn borer numbers were the heaviest in many years and damaged numerous corn fields in south-central and eastern PENNSYLVANIA in July, but a good growing season helped produce a good crop. Fall populations on field corn in DELAWARE decreased for the first time in 5 years. Borers averaged 213 per 100 plants in 1967 which was nearly 100 less than in 1966. Infestations were equally widespread in each county. Overall numbers were not as heavy as expected in June and July in MARYLAND. Stalk and whorl infestations ranged 20-50 percent in early planted corn. Light trap collections on the Eastern Shore were much lighter than in 1966. Plant damage by European corn borer averaged 35 percent on early corn as infestations were light to moderate in central VIRGINIA in early July. In ALABAMA, borers damaged late corn as far south as Autauga County, although numbers were much lower in corn and grain sorghum throughout the northern area than in the past 4-5 years. Numbers were lighter in 1967 than in 1966 in ARKANSAS. Stalk infestations averaged 12 percent and borers 999 per acre. Populations were the lightest since 1963 in MISSOURI during the fall abundance survey. Numbers were lighter in 1967 than in 1966 in the northern area although infestations were heavy in early corn in the southwestern area. The first European corn borer moth of the season was trapped May 5 at Portageville, New Madrid County, and pupation was completed by May 11 in southeastern Missouri.

The 1967 European corn borer fall abundance survey indicated numbers were much lower than in 1966 in KANSAS. Controls were applied in the northeast area as a precautionary measure as severe damage occurred in this area in 1966. Overwintering mortality ranged 5-82 percent with an overall average of 22 percent in 10 southeastern SOUTH DAKOTA counties in late April. The first moths were taken in light traps at Brookings on June 28, 2 weeks later than in 1966. Larvae damaged 40-50 percent of the corn whorls in Yankton County by July 7 and damaged 10-20 percent of the whorls in the Beresford area, Lincoln County. Whorl damage ranged 20-95 percent in early planted fields a week later with counts of 2-3 larvae per whorl common in Clay, Lincoln, and Yankton Counties. All stages were present from mid-August to the first of September. Very few corn fields were treated. Control ranged 75-85 percent in treated areas in Yankton, Lincoln, and Hutchinson Counties. Fall populations of European corn borer decreased or remained at low levels in the south-central, southeast, east-central, central, and north-central sections of South Dakota. Increases were noted especially in Day, Grant, and Roberts Counties in the northeastern area where larvae averaged 155 per 100 stalks. This was the highest average for the area in the last 5 years. The overwintering larval mortality of 21 percent in NORTH DAKOTA was the same as in 1966. Adults appeared in light traps June 28 and peaked July 7-9. Larvae appeared July 17-23. Less than 1 percent of the first-brood larvae had pupated by August 14-20 and no second brood occurred. The fall abundance survey indicated a decrease in populations from 1966. Counts averaged 101 borers per 100 plants with 49 percent of plants infested in 5 southeast counties in 1967 compared with 190 borers per 100 plants in 1966. A eulophid wasp (Sympiesis viridula) parasitized less than 1.5 percent of the borers. Distribution of European corn borer is now statewide in North Dakota as infestations were found in Burke and Divide Counties.

European corn borer spring, summer, and fall surveys were conducted in Cuming and Hall Counties, NEBRASKA. Winter mortality averaged 95 percent in Cuming County with 888 live larvae per acre and 96.6 percent in Hall County with 1,623 live larvae per acre. About 12.5 percent of the larvae had pupated in Cuming County by May 20 and 32 percent had pupated in Hall County by May 23. Moths were taken in light traps in the eastern area in late May and the second-brood flight peaked about August 15. Populations were below average in Cuming County and slightly above in Hall County in late July and early August. Fall surveys

indicated the lowest populations in 13 years in Hall County and the third lowest in Cuming County as numbers generally decreased in the 5 major corn-producing districts.

European corn borer numbers were economic only in northwest and west-central MINNESOTA. Larval counts in the fall averaged 209 per 100 plants in the northwest district compared with 152 per 100 plants in 1966. The larval count of 60 per 100 plants in the west-central district was about the same as in 1966. Low numbers were found in the southwest, south-central, southeast, and east-central districts where borers ranged 10-20 per 100 plants during the summer. The second-generation population was low due to the late season and cool summer. Economic populations may occur in the northwest district in 1968 and some problems will occur in the west-central district if conditions are favorable. There should be no problems in other areas of Minnesota during 1968. An overwintering survival of about 90 percent in WISCONSIN was indicated by corn stalk dissections made in early April. Pupation of European corn borer larvae was noted in Dane County in late May and the adult flight was well underway by early June. The moth flight was 90 percent complete in the southern area by July 1. First-generation larvae were as high as 40 per 50 plants in mid-July. Second instars were prevalent by July 14, third instars by July 21, fourth instars by July 28, and fifth instars by August 4. The first pupae appeared in mid-July. Adult emergence began by August 4 and peaked late in August. The August flight and egg laying was prolonged by cool weather. First through third instars of second-generation larvae were numerous the first of September. Controls were applied to much sweet corn by canners in 1967.

Overwintering mortality of European corn borer larvae was 17.6 percent in IOWA in 1967 compared with 17.7 percent in 1966. Adults appeared in light traps in late May and peaked with the second brood August 12-25. Summer survey was completed the week ending July 21 with averages of 27.3 percent infested plants and 45.9 borers per 100 plants. The fall abundance survey was completed the second week of October. State averages were 52.8 percent infested plants and 55 borers per 100 plants. Crop loss was estimated at about 15.5 million dollars. First-generation populations damaged a few fields in 1967 in ILLINOIS. The average population in 19 counties was 8 per 100 stalks of corn, the highest since the 1963 average of 10 per 100 stalks. Controls were applied to 65,365 acres. Second-generation populations for 36 counties surveyed annually averaged 61 per 100 stalks compared with 120 in 1960. This is a low overwintering population. Populations in INDIANA were slightly lower in 1967 than in 1966. Statewide averages were 25.8 percent infested plants in 1967 compared with 30.6 percent in 1966. First-generation damage throughout the State was very light due to delayed planting. Infestations were heaviest in the northernmost quarter of the State where light trap catches ranged 123-511 during the week ending August 25.

European corn borer first-brood larvae were above normal in MICHIGAN for the second consecutive year. Some field corn was sprayed in the southern counties. Plant infestations in some fields in July ranged up to 82 percent in Lenawee County; 75 percent in Monroe, St. Joseph, and Berrien Counties; 68 percent in Livingston and Jackson Counties; and 40, 17, and 7 percent in Lapeer, Saginaw, and Tuscola Counties, respectively. These infestations averaged about 50 percent lower than those recorded for the heaviest infested fields. The first European corn borer adults of the season were taken in blacklight traps in early June and second-brood emergence began in early August. Second-brood larvae were widespread and heavier than usual in corn during September in Michigan.

European corn borer pupation began in southeastern OHIO in late April. The first adult of the season was noted May 17. Pupation began in northern counties in late May and adults began to appear in early June. The first generation damaged whorls from late June through July. Plant infestations up to 100 percent per field were present in 30 widespread counties with the heaviest numbers in the south-central area. Damage was heaviest in advanced fields and lightest in early fields. First-generation larval development was nearly complete in southern Ohio by mid-July and some new adults had begun oviposition. First-

generation adults did not appear in the northern area until mid-August. The fall survey indicated much lower numbers in 1967 than in 1966. Infestations averaged 7.7 percent in 11 counties in north-central, northwestern, and southwestern Ohio. Development of the second generation of European corn borer was delayed in Ohio due to very cool temperatures in August which partially accounted for the low populations.

SOUTHWESTERN CORN BORER (Diatraea grandiosella) summer larvae were active on sorghum from late September through October in Maricopa County, ARIZONA. Numbers were heavy on 2,000 acres of corn at Willcox, Cochise County, in mid-October. Larvae were lighter in cornstalks in most areas of NEW MEXICO, although infestations were heavier in 1967 than in the past 5 years in Bernalillo and Valencia Counties. No larvae were found in the counties north of Bernalillo County. Southwestern corn borer caused some lodging of corn in Lee County, TEXAS. Cornstalk infestations ranged 10-75 percent in late fall and early spring in southwest, east-central, and west-central OKLAHOMA. Light numbers were noted in June in the north-central area. Infestations in ARKANSAS were similar to 1966. Southwestern corn borer was a serious pest on corn in northwest and north-central ALABAMA and was light as far south as Washington County. Infested Jackson, Chilton, Autauga, and Lowndes Counties in 1967 to bring total infested counties in State to 34. Winter mortality averaged 75 percent in southeast MISSOURI during mid-March abundance survey. Pupation averaged 20 percent by May 13. The first moth of 1967 was trapped at Portageville, New Madrid County, by May 6. Highest populations on record for 6 extreme southeastern counties were shown by the fall abundance survey. Low numbers were observed in the southwest area and Iron and St. Francois Counties were new county records. Numbers increased in the southernmost 2 tiers of counties in ILLINOIS.

SOUTHERN CORNSTALK BORER (Diatraea crambidoides) stalk infestations ranged 20-45 percent during early July in the more advanced corn in eastern Wicomico County, MARYLAND. Southern cornstalk borer was found with other corn borers mainly in late corn in the Sand Mountain area of north ALABAMA with lower infestations extending south into Lee County.

NEOTROPICAL CORN BORER (Diatraea lineolata) and D. saccharalis complex caused some damage in Hidalgo and Cameron Counties in TEXAS.

BLACK CUTWORM (Agrotis ipsilon) seriously damaged early and late corn plantings in some areas of DELAWARE. Black cutworm damage necessitated replanting of several hundred acres of corn on the Eastern Shore of MARYLAND during late May and early June. Moths were above normal in light traps. Damage was severe to young corn in a few widely scattered fields in central VIRGINIA during June. This damage was the heaviest since 1962. Infestations were severe to sweet corn in muckland growing areas of the Everglades and Zellwood in spite of standard cutworm treatment in FLORIDA. Black cutworm and other cutworms damaged corn in 26 counties during the latter half of June in OHIO. Reports of young corn damage were more frequent in 1967 than in recent years. Activity decreased by early July with the cessation of larval feeding and development. Economic corn damage was again concentrated in the central districts of INDIANA. Infestations were heaviest in the west-central districts and in Hancock, Shelby, Rush, and Decatur Counties of the central district. Larval numbers peaked during June 12-22 as many infestations were found on high ground as well as low, poorly drained areas. Damaging infestations on corn were very few in 1967 as very light numbers occurred throughout MISSOURI. About 4,500 acres of newly planted corn were destroyed in Brazoria and Ft. Bend Counties of TEXAS during March. Damage was little to corn in KANSAS. Few light infestations occurred on corn in southeastern NEBRASKA. Numbers and damage were heavy in a 50-acre corn field near Madison, Lake County, SOUTH DAKOTA, in early June. Larvae ranged 1-4 and averaged 2 per hill.

WESTERN BEAN CUTWORM (*Loxagrotis albicosta*) numbers have increased in importance on corn in NEBRASKA the last 3 years. Egg masses and first instars had infested 5-25 percent of the corn plants checked in Lincoln and Hall Counties on July 27 as eggs averaged 45 per mass. Oviposition decreased in early August although a few fresh egg masses were found on August 27. Larvae averaged 3 per ear in some completely infested Hall County fields. Larvae began to enter the soil about September 1 and only a few remained in ears in Hall County by October 4. Ear infestations of 4.2 to 100 percent (average 51 percent) were damaging in all 30 fields surveyed in Hall County. Grain loss ranged 0.3-8.7 percent on individual farms and averaged 3 percent in Hall County. Adults were taken in light traps at Lincoln and Mead. New county records include Boone, Boyd, Frontier, Furnas, Hitchcock, Howard, Merrick, Nance, Phelps, Red Willow, Keith, and Lincoln. Only the latter 2 have previously been reported in the CEIR. Damage was heavy on corn in Weld County, COLORADO.

VARIEGATED CUTWORM (*Peridroma saucia*) populations remained very low in 1967 as only trace numbers were taken in light traps throughout INDIANA. Variegated cutworm was a local problem on corn early in the season in CALIFORNIA. GRANULATE CUTWORM (*Feltia subterranea*) severely infested sweet corn in the muckland growing areas of the Everglades and Zellwood in spite of cutworm treatment in FLORIDA. PALE WESTERN CUTWORM (*Agrotis orthogonia*) damaged corn in some southwestern KANSAS counties in May and some controls were applied. Light numbers were found in OKLAHOMA. CLAY-BACKED CUTWORM (*Agrotis gladiaria*) and DARK-SIDED CUTWORM (*Euxoa messoria*) damaged field corn very much in Warren County, NEW JERSEY, during early June. Controls were applied in many areas. A CUTWORM (*Feltia ducens*) damaged corn planted on former soil bank land in the NEBRASKA Panhandle. CUTWORMS were widely distributed on corn in MINNESOTA in June and, except in a few cases, populations were light in 1967. Cutworm damage was not serious in NEW YORK, but populations were severe in CALIFORNIA in December.

FALL ARMYWORM (*Spodoptera frugiperda*) was common on whorls, tassels, and up to 25 percent of untreated sweet corn in the Hudson Valley of NEW YORK from late August onward. The moderate abundance in the western section ranked fall armyworm next to European corn borer as an ear pest in late September. Populations were generally heavy throughout NEW JERSEY as injury was extensive to sweet corn from mid-August through September. Damage was heavy to late corn in northern and central VIRGINIA in late July and early August. Numbers were very abundant late in the season and damaging during most of 1967 in the Everglades of FLORIDA. Controls could not be obtained except on a 24-hour spray schedule during late April and May. A total of 98.5 percent of the larvae in ears in the fall and 55 to 70 percent in the late spring were fall armyworm. Egg masses averaged 4-5 per young plant. Numbers were abundant on sweet corn during the early fall in the Bradenton area, Manatee County. Damage increased on sweet corn at Sanford as a 150-acre crop was lost in late June. Populations were higher in July than in previous years. *S. frugiperda* and *Heliothis zea* caused the worst problem in years in the Zellwood and Oviedo areas of Orange County. Sprays were required twice a day on sweet corn during part of the growing period as larvae remained longer in the fall than in previous years. Some late-planted field corn was abandoned at Sanford, Seminole County, due to damage and dry weather last spring. Larvae were mostly heavy in the whorls of late-planted June corn from Ocala northward. Numbers were heavy on late corn and sorghum throughout ALABAMA. Populations were heavy but seldom economic on young grain sorghum in ARKANSAS in July and August. Larvae were heaviest in low places. Damage was economic to forage, corn, Sudan grass, and grain sorghum in most areas of TEXAS except the High Plains. Numbers were active in corn and grain sorghum from early August through mid-November in OKLAHOMA. Plant infestations of 5-80 percent were moderate to heavy on late-planted corn and grain sorghum throughout MISSOURI. Damage was severe on some late-planted corn and sorghum in the southeast, south-central, and east-central district of KANSAS during July and August as controls were applied to large acreages. Infestations had increased over 1966, as up to 24 percent of the late-planted corn was infested in some eastern NEBRASKA fields. Damage on corn has been increasing during the past 3 years in COLORADO.

WESTERN YELLOW-STRIPED ARMYWORM (Prodenia praefica) was severe and caused heaviest infestations in many years in CALIFORNIA from July to October. YELLOW-STRIPED ARMYWORM (Prodenia ornithogalli) damage was severe on late-planted sorghum in a few fields in Harvey and Sedgwick Counties, KANSAS, during August. This species was heavier in all crops in 1967 than during the past 3 years.

SORGHUM WEBWORM (Celama sorghiella) was heavy on hundreds of acres of grain sorghum during the summer in Dade County, FLORIDA. Infestations were noneconomic on grain sorghum in ALABAMA. The first record was found June 20. Some fields had 100+ larvae per head in southwest ARKANSAS in early September. Low larval numbers occurred in the northwest area in early October. Generally light infestations infested grain sorghum in Brazos, Travis, Hamilton, Jackson, and Limestone Counties in TEXAS. Numbers were light in OKLAHOMA and damaged sorghum in September in Wilson County, KANSAS.

STALK BORER (Papaipema nebris) was found in many corn fields in north-central and northeast districts of KANSAS, as infestations ranged 10-25 percent in border rows. Damage was very light to border rows of corn in eastern NEBRASKA and was similar to previous years on corn in RHODE ISLAND.

LESSER CORNSTALK BORER (Elasmopalpus lignosellus) was more severe in 1967 than for several years on field corn in northern FLORIDA. Numbers were very heavy and damage was severe at Live Oak, Suwannee County, where 1,200 acres were lost. The increased damage was partly due to a very dry spring and late planting. Infestations were heavy on sweet corn in the Everglades with some damage to most sugarcane fields in the Belle Glade area during the spring. Damage was heavy on several hundred acres of grain sorghum in Gilchrist and southern Suwannee Counties during August and caused a loss of 90 percent of sorghum stored in a barn in Jackson County during June. Grain sorghum and Sudan grass were damaged in central, north-central, southeastern, and southern TEXAS. Populations infested grain sorghum in Maricopa County, ARIZONA, during mid-August and larvae were heavy on corn and sorghum in Maricopa and Yuma Counties in late August.

WESTERN CORN ROOTWORM (Diabrotica virgifera) was heavy in NEW MEXICO and damaged several corn fields in the Farmington area, San Juan County, early in the season. NORTHERN CORN ROOTWORM (D. longicornis) was economically important in central and southern TEXAS. Light numbers of SOUTHERN CORN ROOTWORM (D. undecimpunctata howardi) occurred in OKLAHOMA. Northern corn rootworm was collected from corn in De Kalb County, ALABAMA, in September 1967, for a new county record. Northern corn rootworm adults in central MARYLAND were fewer on corn silks in 1967 than in 1966, but were common in northern DELAWARE. Although the northern species was more numerous in PENNSYLVANIA than a few years ago, no damage was noticed on the corn crop. Corn rootworms occurred throughout NEW YORK, but economic levels were reached only in the areas where corn was grown annually and not in rotation. These areas were largely in Cayuga, Steuben, Wyoming, and Seneca Counties. By the first week of July in OHIO, northern corn rootworm had hatched and larvae were feeding on corn. Adults were first noted in late July in the southern sections and emergence was in progress statewide by early August. From the last half of August to the first week of September, adults averaged 23,992 per acre for 52 counties and 1.4 per plant while plants averaged 17,233 per acre. Populations were highest in the southwestern and northwestern counties. Although large numbers infested some fields, lodging was not a problem. Fields with "goosenecking" and weak root systems were common in the western section where northern corn rootworm populations were the highest. The southern species adults averaged 824 per acre in 52 counties and were most common in the south-central and southwestern sections where populations averaged, respectively, 2,676 and 1,284 per acre. The northern species adults began to emerge during late July and peaked during the first 2 weeks of August in INDIANA. The heaviest populations infested the central districts where adults ranged 0-13 and averaged 4 per silk on 80 percent of the corn. In the northern districts, adults averaged 2 per 10 silks.

Numbers were more abundant in past years in ILLINOIS. Of 200 fields surveyed, adults were sufficiently abundant to collect in 26 fields. Lodging was severe in some areas. Controls for adults were applied to 47,115 acres. Western corn rootworm adults were found in 10 more counties in 1967 in the northwestern area which increased the infested area to 20 counties. The first adults emerged August 4. Damage was severe in Mercer County. Southern corn rootworm numbers were sufficient to damage a few fields in the southern half of the State. The northern species was heavy in a few fields throughout northern MISSOURI and damaged fields in Ralls County. On June 12, the first western corn rootworm hatched and, on July 6, the first adult of the season was collected. Larvae peaked 7 to 10 days later than last season. From mid-to-late July, larval damage was evident in fields throughout the northwest area. The western species discovery in Audrain County was a new record. All 3 species were heavier than in 1966 in KANSAS although favorable weather reduced damage. Mostly western corn rootworm adults were higher in 1967 than in 1965 or 1966 and many fields were treated. In the western area, the northern species had 11 new county records and the western species 10. In eastern and northeastern COLORADO, western corn rootworm caused considerable losses and, in some fields, 95 percent of the stand was lodged. In NEBRASKA, corn rootworm problems increased because excessive rainfall, late egg hatch, and early planting rendered controls ineffective. Numbers remained at about the same level as in recent years. The western species remained prevalent, but northern corn rootworm appeared to increase in the southeast. The first larvae were found at the Mead Field Laboratory on June 17. Western species adults were first observed on July 12 and some adults were still present in corn in the northeast on October 19. The southern species did not significantly affect corn. In IOWA, western corn rootworm was the dominant species in 64 counties and distribution is now statewide as all 3 species are present. About 3.7 million acres were treated at planting time and 0.5 million acres at cultivation time for a total of 4.2 million acres treated in 1967. Loss, including control costs, was estimated at \$59 million.

In WISCONSIN, northern corn rootworm larvae averaged 21.3 per corn plant in an untreated field in Rock County in July and, by late July, adults began to appear. In the soil, the percentage of adults and pupae were in the majority. Adult emergence peaked in and was completed after mid-August. Adults were numerous on silks in August and on corn into October. Lodging was scattered but severe in some instances. A survey at the end of August showed that the northern species had gradually increased and that the western species was present in 26 counties, 13 of which were new records. Populations in several counties exceeded that of the northern species. An estimated 20,000 acres of corn was treated in MICHIGAN for northern corn rootworm and other soil insects. Larval infestations were again spotty and overall loss was low although some damage occurred in Monroe, Washtenaw, and other southern counties. In the third week of June, egg hatch started in Monroe County research plots and, by June 26, egg hatch was complete. The first pupation started in the area about July 16 and, in late July, the first adults appeared. In mid-August, adults were common, but corn pollination occurred before major silk feeding took place. The northern and western species remained a problem on corn in southern MINNESOTA. Egg hatch was about 6 days earlier in 1967 than in 1966 and extended from June 22 well into July. Adult emergence began during the week of July 24 and peaked August 14. High winds and rain alone lodged many corn fields, especially in the southeast district. An adult survey of 45 counties in the southern half of the State started on August 14. While northern corn rootworm was still the dominant species, western corn rootworm had increased so that important numbers were present, especially in the southeast and south-central district counties. There was a general trend and movement of the western species eastward. Populations increased, especially in the southeast district where Fillmore and Goodhue Counties averaged over 100,000 beetles per acre, the highest in the State. Populations decreased again in the southwest district as only Rock County maintained high numbers. High counts were expected throughout the southern half of the State. Total of 98.4 percent of the beetles was counted in fields that had been in corn for 2 or more years, while only 1.6 percent was counted in fields where corn was grown for the first year.

The 2 species of economic importance in SOUTH DAKOTA in 1967 were the northern and western corn rootworms. Controls were applied to an estimated 1,450,000 acres. Larval numbers, incidence of infestation, and extent of damage were heavier in 1967 than in 1966. Although the initial hatch occurred at about the same time on June 23 in Yankton County, peaks of up to 55 larvae per plant were not reached until the week of July 14, seven days later than 1966. On July 18 western corn rootworm adults were numerous in a field in Yankton County but had just begun to emerge further north in Hutchinson County. Adults were out well ahead of silking, but the high localized adult concentrations of 1966 did not occur. Although silks were damaged, pollination was reduced only a little. Prior to the middle of August, some spraying for adults was undertaken. Due to high adult numbers, up to 22 per stalk, from September to frost in Yankton and Lincoln Counties, infestations for 1968 are expected to equal those of 1967. Autumn observations indicated that the ratio of western to northern species was increasing in favor of the western species in east-central and northeast areas. The extent of the infestations was also increasing in those areas. The western species was found for the first time in NORTH DAKOTA near Fargo, Cass County, and also in Richland, Ransom, and Sargent Counties. Less than 1 adult per 100 plants infested 11 fields only. In MONTANA western corn rootworm occurred only in the Forsyth area in Rosebud County.

CORN FLEA BEETLE (Chaetocnema pulicaria) was taken initially in grass sweepings during the first warm weather around May 1, in the Hudson River Valley of NEW YORK. Although unusually cold weather retarded movement into sweet corn plantings in May, a high percentage of untreated plants acquired some feeding marks, and some plants showed Stewart's bacterial wilt in June. Up to 10 percent of plants of some varieties showed streaks or extensive wilt. The summer brood was general but light. No significant wilt problem occurred on late corn. Only a few beetles were collected on untreated sweet corn in Monroe County September 26. Field corn was damaged in areas of Kent and Sussex Counties during late May and early June in DELAWARE. Adults ranged 5-15 per plant on young sweet corn at numerous localities in MARYLAND during late May. Adults occurred throughout ALABAMA and were most damaging to seedling corn until plants were 24 inches high. Populations were as high as 15 per plant in some fields early in the season as damage was occasionally severe. A total of 49,191 acres was treated. Adults ranged 1-11 per plant on small corn throughout MISSOURI. Infestations were reported from early May in southern areas to late May in the north. Numbers continued to decrease in INDIANA, ranging 1-3 per corn plant by late May.

FLEA BEETLES damaged young corn in northeast KANSAS during April and May. Controls were applied. DESERT CORN FLEA BEETLE (Chaetocnema ectypa) damage was average on corn in early summer in Washington County, UTAH.

WIREWORMS caused damage in southeast and east-central counties in NORTH DAKOTA. Losses of 10 percent were evident in some Cass County corn fields as some damaged fields were reseeded. Scattered crop damage in MINNESOTA occurred mainly to corn in June. Replanting of some fields was required and a few of the seriously damaged fields were in the "Idle Acres" program in 1966. Damage was severe in some corn fields in the NEBRASKA Panhandle where untreated seed was planted. Numbers were spotty and damage economic on sorghum in a 5-county area near Mitchell, Davison County, SOUTH DAKOTA. Another WIREWORM (Melanotus communis) seriously damaged sweet corn in spots in all the Everglades area, and was prevalent and causing heavy sugarcane stand loss in some fields in the Belle Glade area, FLORIDA.

SUGARCANE BEETLE (Euethola rugiceps) destroyed young corn on several hundred acres in mostly the Black Belt area of western ALABAMA.

A WEEVIL (Hyperodes humilis) was a serious pest in the fall and winter crop of sweet corn. Damaged plants were frequently killed by a bacterial disease. Plant infestations were 12-25 percent on untreated corn at the Everglades Experiment Station at Belle Glade, Palm Beach County, and were higher in some commercial fields in FLORIDA.

SORGHUM MIDGE (Contarinia sorghicola) was heavy in late-planted sorghum in a small area of southwest MISSOURI. Numbers were heavy and damage severe to late-planted sorghum in September in Wilson and Montgomery Counties, KANSAS, and numbers were light in Chautauqua County. The first adults were found in early August in southwest ARKANSAS. Numbers increased to the heavy level in this area August 25 when adults ranged 25-30 per head. Emergence from caged infested heads was as late as October. Grain sorghum planted in April generally escaped infestations and untreated late plantings in May were damaged in the southern area. No infestations were reported from the northern section. Populations were light in OKLAHOMA. Populations were the heaviest in the central area of TEXAS in 1967. Economic levels justified control from mid-June to July in most areas as very heavy infestations occurred on late-planted grain sorghum in Brazos County.

CHINCH BUG (Blissus leucopterus) occurred in isolated fields in central and south ALABAMA; numbers were lighter than normal. Light to heavy infestations damaged some corn and grain sorghum in central and southern TEXAS. Damage was most extensive in Falls, Waller, Burleson, Lee, Liberty, and Delta Counties. Populations were first noted on March 1 in barley planted in sorghum stubble in Noble County, OKLAHOMA. Numbers increased in early June as heavy infestations damaged sorghum fields in the central and southwest areas. Infestations did not reach 1966 levels, but controls were applied in some sorghum fields in south-central KANSAS. Damage occurred on some seedling corn in April in Montgomery and Lyon Counties. Spring surveys in NEBRASKA for overwintering adults indicated a high potential for economic populations on corn in 1967. It averaged 180-245 per square foot on bunch grasses in Gage, Lancaster, and Jefferson Counties in April. Cool, wet weather in June kept populations below economic levels. Controls were applied to a few southeastern fields. No economic infestations were reported in INDIANA during 1967. Numbers ranged 5-20 per corn plant during early July in a few scattered fields in Allen County.

APHIDS were present early in CALIFORNIA but did not become damaging until late in the summer. Another APHID (Rhopalosiphum padi) had colonies present in mid-to-late August on corn in Clay County, SOUTH DAKOTA.

THRIPS damaged corn and sorghum in Finney County, KANSAS, in June and another THRIPS (Frankliniella williamsi) was very prevalent on corn plantings in Los Angeles County, CALIFORNIA.

TWO-SPOTTED SPIDER MITE (Tetranychus urticae) was not a problem on corn in COLORADO due to above normal precipitation. Infestations including eggs were observed on hybrid sweet corn near Melba, IDAHO. Populations moving in from the field margins increased during the summer and were serious in several fields July 28 and August 11. This species was the dominant spider mite in CALIFORNIA in 1967. SPIDER MITES (Tetranychus spp.) were scattered and serious on corn in the Mitchell and North Platte Valleys of NEBRASKA. The infestation was generally much lower in 1967 than 1966. They were also a problem in corn fields in Chaves, Dona Ana, Bernalillo, and San Juan Counties, NEW MEXICO. Other SPIDER MITE (Oligonychus sp. and/or Tetranychus sp.) infestations on corn increased in mid-July and were medium to heavy in August and early September in Churchill and Pershing Counties, NEVADA, as controls were required. Populations were generally light in the other counties. MITES were damaging from June to December in CALIFORNIA.

BANKS GRASS MITE (Oligonychus pratensis) damage to corn was late and generally lighter than during recent seasons in UTAH. Damage was common late in season. This species and O. stickneyi damaged milo in TEXAS.

GARDEN SYMPHYLAN (Scutigerella immaculata) and another SYMPHYLAN (S. nodicercus) seriously stunted corn in Clinton, Shelby, Harrison, Randolph, and Ohio Counties, INDIANA. The 1967 infestations were more widespread than in 1966. Garden symphylian infested numerous corn fields in the eastern half of PENNSYLVANIA. Crops in some areas were a total loss. Damage on sweet corn in 1967 was similar to that of 1966 in NEW JERSEY.

SLUGS damaged field corn more than usual in MICHIGAN during late June and early July, but infested fields had high organic content, and plants withstood the damage. Slugs damaged several acres of young corn in Carroll County, MARYLAND, and caused much damage to sod-planted corn 2 to 6 inches high in late May and early June in Pulaski County, VIRGINIA.

SMALL GRAINS

Highlights:

ENGLISH GRAIN APHID infested small grains early in the season. Although counts were high in some areas, numbers decreased and no economic damage occurred. This pest appeared earlier than normal in Minnesota. WESTERN WHEAT APHID caused severe damage to wheat and barley in many areas of Montana. CHINCH BUG populations were very low in Illinois compared with 1966. WIREWORMS damaged small grains in some areas. FALL ARMYWORM damaged rice in Texas and required controls on this crop in Arkansas. PALE WESTERN CUTWORM damaged wheat in western Kansas and heavy adult flights in western Nebraska indicate possible heavy infestations in that area in 1968. HESSIAN FLY infestations increased in west-central Virginia but reached an alltime low in Illinois. The increase in Hessian fly infestations observed in Kansas in 1966 continued into 1967. BROWN WHEAT MITE damaged small grains throughout the High Plains area of Texas and populations were moderate to heavy in several areas of Oklahoma. This pest damaged several thousand acres of dryland wheat in Utah.

ENGLISH GRAIN APHID (*Macrosiphum avenae*) damaged developing wheat heads in numerous fields in some southern counties in ALABAMA during the season. Populations increased in heads of wheat in ARKANSAS by April 14 but were not economic. This aphid infested wheat in OKLAHOMA from January through mid-April, but counts seldom averaged 20 per linear foot. Populations remained light throughout the spring and fall in KANSAS and caused no damage to small grains. English grain aphid was light in IOWA with no damage reported and infested wheat during May in OHIO where it caused no significant damage.

English grain aphid populations up to 40 per sweep appeared on wheat in the southeast and southwest districts of ILLINOIS in April. Numbers then declined rapidly and no economic damage was observed. During the first week of April, winged adults were detected on rye in southern and western WISCONSIN. By April 21, nearly full-grown nymphs were present. Populations averaged about 2 per sweep in oats in southern and central Wisconsin counties by early May. Some increase occurred in early June, but oats matured before this aphid caused any damage. English grain aphid moved into MINNESOTA on strong southerly winds on April 14, much earlier than normal. Low populations caused very few problems and, in general, did not present a threat to small grains in the State.

English grain aphid was prevalent on spring wheat in mid-July, two weeks prior to harvest, in northeast and north-central SOUTH DAKOTA. Populations in infested fields ranged from less than 5 to a high of 180 aphids per head, including alatae, apterae, and nymphs. Apparent parasitism by *Aphidius* sp. (a braconid) was at least 15 percent, but actual parasitism was probably higher. Predators, including lady beetles, Neuroptera, and syrphid flies were conspicuous. Aerial sprays were applied to some small grain fields, but controls were generally not necessary. Damage to grains was light and noneconomic. A sampling of field populations in Clay County, South Dakota, in late April and May indicated that counts on oats were lower in 1967 than in 1966. Overwintering forms of English grain aphid appeared in east-central and southeast NORTH DAKOTA during mid-May. With cool weather during June, populations increased and infested grain by the end of the month. Due to higher temperatures in July, these populations did not become economic. English grain aphid caused some concern to wheat in the Triangle Area of Chouteau, Liberty, Toole, Glacier, Pondera, Teton, and Cascade Counties, MONTANA, but the infestation was light and no damage resulted. Noneconomic populations of this aphid were reported in other counties of the State.

English grain aphid was moderate on wheat in Adams and Benton Counties, WASHINGTON, in May and was unusually numerous on wheat in Whitman County during July. This pest was one of the major aphid species infesting grains in CALIFORNIA during the 1967 season. Heavy infestations of English grain aphid developed in Churchill and Pershing Counties, NEVADA, in late June and July and required controls. Populations were light to moderate in other areas of the State and were controlled by predators and parasites. English grain aphid was generally light in UTAH during 1967.

An APHID (Rhopalosiphum padi) infested small grains in OKLAHOMA in late March and early April. The population in one field of barley in Tillman County averaged 2,000 per linear foot, but elsewhere populations were light. Light numbers of this aphid were again active on small grains in south-central Oklahoma during November and December. R. padi was light in most wheat fields in the western half of KANSAS in the fall. Populations of this aphid on oats in Clay County, SOUTH DAKOTA, during late April and May were much lower than in 1966, and light numbers infested most small grains in east-central and southeast NORTH DAKOTA in 1967.

APPLE GRAIN APHID (Rhopalosiphum fitchii) was moderate on bases of wheat plants in Walla Walla County, WASHINGTON, in May. Populations averaged 50 per wheat plant in Franklin County, Washington, in June. Populations remained light throughout the spring and fall and caused no damage in KANSAS. WESTERN WHEAT APHID (Brachycolus tritici) caused severe damage to wheat and barley during early stages of development in many areas of MONTANA. This aphid caused severe damage to small grains in some areas of Flathead, Teton, Glacier, Toole, and Liberty Counties.

APHIDS in general infested cereal crops early in the season in CALIFORNIA. Crop damage was lighter in 1967 than in 1966 due to abundant late moisture and good growing conditions. English grain aphid, apple grain aphid, and R. padi were the major species infesting grains in the State.

CHINCH BUG (Blissus leucopterus) populations were very low during the fall survey in ILLINOIS. The highest populations occurred in Iroquois County where 27 chinch bugs per square foot of hibernating material were found. The low overwintering population of 1966-67 and the high rainfall and thick stands of grain in May and June of 1967 resulted in low populations in Illinois. No controls were required.

A GRASS BUG (Irbisia pacifica) migrated from giant ryegrass and damaged wheat in the Beaver Dam area of Box Elder County, UTAH. Damage to wheat was spotty in Juab and Sanpete Counties. Damage by SAY STINK BUG (Pitiedia sayi) was scattered and generally light in small grains in Utah.

SUGAR-BEET WIREWORM (Limonijs californicus) larvae averaged 3 per wheat plant in a 300-acre field in Washington County, IDAHO, with bare areas ranging up to 15 feet in diameter. During May, 90 percent of the larvae were full grown. An average of 2 larvae per square foot was observed in a field of wheat in the Parma area during March. Larvae of another WIREWORM (Ctenicera callida) ranged 1-5 per wheat plant and severely damaged 50 acres of a dryland field in Elmore County, Idaho. Also in Idaho, larvae of Ctenicera sp., a species of the mendax group, were found among the roots of winter wheat in Nez Perce County. Wheat stands were reduced between zero and 30 percent along field margins and in rod-diameter areas within fields. Similar damage occurred to wheat in Latah County. What was probably GREAT BASIN WIREWORM (Ctenicera pruinina) damaged fall-planted wheat in the Pullman area of Whitman County, WASHINGTON, in March.

WIREWORMS (Melanotus spp.) caused moderate to severe damage in isolated wheat fields in Cotton County, OKLAHOMA, during November. Damage by unspecified wireworms was evident in small grains in southeast and east-central counties of NORTH DAKOTA. The stands in small grain fields were reduced up to 70 percent in La Moure County and 10 percent in Dickey County, with some damaged fields being reseeded. Damage was difficult to determine due to cool temperatures retarding germination.

NORTHERN CORN ROOTWORM (*Diabrotica longicornis*) populations were above normal on developing barley and wheat in MARYLAND, ranging light to medium in all sections of the State. In KANSAS, unspecified FLEA BEETLES damaged wheat along field margins in Geary County in September and in Barton County in October.

DESERT CORN FLEA BEETLE (*Chaetocnema ectypa*) was a problem on seedlings emerging from sandy soils in Maricopa, Pinal, Pima, Graham, and Yuma Counties, ARIZONA, from early spring into midsummer. Larvae of a WHITE GRUB (*Phyllophaga* sp.), a species near *P. vetula*, destroyed most of a 40-acre field of wheat and denuded spots in several other fields in Curry County, NEW MEXICO, during October.

RICE WATER WEEVIL (*Lissorhoptrus oryzophilus*) caused some concern in CALIFORNIA due to the lack of recommended controls. This pest is increasing in importance in the State. In ARKANSAS, rice water weevil caused more concern than normal due to resistance to recommended controls.

FALL ARMYWORM (*Spodoptera frugiperda*) caused economic damage to rice in TEXAS and required controls on this crop in July and again in August in southwestern ARKANSAS. Infestations were heavy in isolated wheat fields in central, south-central, and southeast OKLAHOMA. Up to 30 fall armyworm larvae per foot of row infested early seeded wheat in southeast and south-central MISSOURI during late September and early October.

PALE WESTERN CUTWORM (*Agrotis orthogonia*) severely damaged many wheat fields in the western third of KANSAS, especially in the southwest area, during April and May. Controls were applied to many fields. Adults were numerous in blacklight collections in Finney County during the fall. Pale western cutworm caused some damage to wheat in scattered areas of the NEBRASKA Panhandle. Adult flights were heavy in western parts of the State indicating possible heavy larval populations in the panhandle and southwestern sections in 1968. Populations in wheat required controls in some areas of eastern COLORADO, but crop loss was light. Although an uncommon pest in UTAH, pale western cutworm caused some light damage during the 1967 season.

WHEAT HEAD ARMYWORM (*Faronta diffusa*) was light in many areas of KANSAS during May and June and caused no appreciable damage. Populations were economic, however, in Valley County, MONTANA.

HESSIAN FLY (*Mayetiola destructor*) infestations were higher in west-central VIRGINIA in 1967 than in 1966. Damage ranged 70-80 percent in one Pittsylvania County wheat field in May. Wheat sampled in 24 OHIO counties prior to harvest showed an average of 30 percent of plants infested this year compared with 35 percent in 1966. Distribution is statewide in Ohio and infestations ranged from zero to all stems infested in a 10-stem sample. Hessian fly populations reached an alltime low of 5 per 100 tillers during the stubble survey in ILLINOIS. This compared with 14 per 100 tillers in 1966. However, some damage to Monon wheat (previously resistant) was reported in the spring of 1967. The stubble survey conducted in 5 counties of MISSOURI indicated populations were low during 1967 and very few growers reported damage.

The Hessian fly flight was early and prolonged in KANSAS during the fall of 1966, but weather conditions were only moderately favorable for larval development and only minor damage was reported. During the spring flight period of April and May in 1967, however, weather favored fly development. Assessment of damage was difficult due to frost and drought damage and lodging due to rain at harvest. The increase of Hessian fly infestations noted in 1966 in western Kansas continued into 1967. The average percent infestation of all wheat varieties by district was as follows: Northeast 0.34, east-central 0.20, southeast 1.04, north-central 0.50, central 1.40, south-central 3.00, northwest 2.80, west-central 3.20, and

southwest zero. Percent infestation in the southwest district was based on only 10 fields surveyed. The percentage of infested grain was very low in several grain-growing counties of MONTANA.

WHEAT STEM MAGGOT (Meromyza americana) infestations ranged up to 80 percent in some wheat fields in Cowley County, KANSAS, in May. In the spring wheat area of northeast and north-central SOUTH DAKOTA, the number of "white heads" was greater in 1967 than in 1966. Due to a greater total number of heads, however, the estimated crop losses of 1-2.7 percent were lower than in 1966. WHEAT MIDGE (Sitodiplosis mosellana) was of concern in Clinton and Lycoming Counties, PENNSYLVANIA, where infested and shriveled kernels averaged as high as 20 percent in some fields.

BARLEY THRIPS (Limothrips denticornis) populations were lower in SOUTH DAKOTA than in 1966, being generally light throughout the State. No economic infestations or damage was reported in barley. GRASS THRIPS (Anaphothrips obscurus) was light in several northeastern counties of MONTANA, the only economic infestations occurring in Richland County. THRIPS, primarily Frankliniella bispinosa, were abundant on oats in FLORIDA during the spring of 1967. Populations peaked in April.

WHEAT STEM SAWFLY (Cephus cinctus) larvae were full grown and at bases of wheat stems by late June in OHIO. Stem cutting, however, was of minor importance. This pest was severe in barley in Glacier County, MONTANA.

WINTER GRAIN MITE (Penthaleus major) was generally light throughout TEXAS. Some damage occurred in the north-central area in March and again in November. Some controls were applied in Bell, Erath, and Hamilton Counties. Populations were light on wheat during January in OKLAHOMA, but increased to damaging levels in February and March. Counts ran as high as 400 per linear foot in Tillman County and averaged 50-75 per linear foot in scattered fields in the southwest area of the State. Winter grain mite populations remained low during the spring in KANSAS and caused no concern.

BROWN WHEAT MITE (Petrobia latens) damaged small grains throughout the High Plains area of TEXAS after increasing to high levels during late March. This mite infested wheat from January to early April in OKLAHOMA. Counts in the southwest ranged 1,000-1,500 per linear foot; populations were moderate to heavy in many northwest, north-central, central, and west-central counties. Fall activity began in Greer County in mid-November and heavy populations were reported in scattered fields throughout the rest of the southwest area through December. Brown wheat mite was moderate in isolated areas of KANSAS in March and April, with controls applied to some fields. In most instances, however, heavy rains reduced populations below economic levels. Brown wheat mite populations were heavy in a small area of Teton County, MONTANA. In UTAH, this mite damaged 20,000 acres of dryland wheat in the Monticello area of San Juan County, 2,000 acres in Salt Lake County, and some fields in Tooele County. Brown wheat mite populations in NEVADA were generally light on small grains except in Lyon County where some heavy infestations developed on wheat in May.

BANKS GRASS MITE (Oligonychus pratensis) ranged light to moderate and damaged some wheat in Trego and Grant Counties, KANSAS, in March. Unspecified MITES damaged small grain foliage late in the season in CALIFORNIA.

Normal populations of a TADPOLE SHRIMP (Triops longicaudatus) in rice fields required controls in CALIFORNIA.

TURF, PASTURES, RANGELAND

Highlights:

CHINCH BUG continued a serious pest of St. Augustine grass lawns in Alabama. GRASS BUGS caused damage over much of 80,000 acres of range grasses in Utah. TWO-LINED SPITTLEBUG damaged 60,000 acres of St. Augustine grass in Florida. CICADAS were the heaviest in several years in Nevada. MOLE CRICKETS were severe on various grasses throughout Florida. BILLBUGS and WHITE GRUBS caused damage in most States reporting. SOD WEBWORMS were heavy in Rhode Island, New Jersey and Nebraska. FALL ARMYWORM was the principal insect in Arkansas pastures and was more widespread in 1967 in Alabama than in the past 5 years. A PYRAUSTID MOTH was heavy to severe on St. Augustine grass in some areas of Florida.

CHINCH BUG (Blissus leucopterus) continued a serious pest on St. Augustine grass lawns in central and southern ALABAMA. Damage and control problems made replacement of this grass with other grasses necessary. Numerous St. Augustine grass lawns were infested at Norfolk, VIRGINIA, in early October. Infestations were light throughout central and northern NEW JERSEY during the summer, but populations increased in late August and early September. Chinch bug and HAIRY CHINCH BUG (B. hirtus) infestations were noneconomic in RHODE ISLAND. Spring surveys for overwintering populations of chinch bug indicated economic populations for NEBRASKA in 1967. In April, adults averaged 180-245 per square foot on bunch grasses in Gage, Lancaster, and Jefferson Counties. Cool, wet weather in June kept populations mostly below economic levels. Controls were applied to a few southeastern fields in Gage, Pawnee, and Saline Counties.

SOUTHERN CHINCH BUG (Blissus insularis) adults were active very early in 1967 due to the unseasonably warm weather in southern TEXAS. Damage was heavy and spotty on St. Augustine grass pastures on experimental and commercial ranches in the Belle Glade area, FLORIDA. Damaged areas usually did not exceed a few acres although 20 and 10-acre spots were killed in 2 pastures.

GRASS BUGS, particularly Labops hesperius and Irbisia pacifica, caused damage over much of 80,000 acres of crested and intermediate wheatgrasses as well as other planted range grasses in Garfield and Kane Counties, UTAH. Overall severity was much less than the heavy damage of 1966. A total of 400 acres of planted grass was sprayed in Salina Canyon and additional controls were applied in a 2,000-acre spray test in the Pines area of Garfield County and some acreage in Kane County. Black grass bugs damaged several thousand acres of planted grasses in the Beaver Dam area, Box Elder County, and in Iron, Juab, Wayne, Millard, Sevier, Sanpete, Morgan, San Juan, Washington, and Weber Counties. Another GRASS BUG (I. californica) was prevalent on native grasses in CALIFORNIA.

TWO-LINED SPITTLEBUG (Prosapia bicincta) damage was scattered on pastures in the Everglades area of FLORIDA but was most serious on 60,000 acres of St. Augustine grass on one ranch. Adults killed several hundred acres of newly planted grass. Damage was severe on 450 acres of mature pastures at the same location. Light trap catches at the Everglades Experiment Station averaged less than 50 percent of those in 1966. This pest appeared in early spring throughout ALABAMA. Infestations occurred mostly on Coastal Bermuda grass in central and southern areas and lawn grasses in isolated areas of the southeastern and southwestern sections. Populations were lighter in 1967 than in 1965 and were about the same as in 1966.

AN APHID (Rhopalosiphum padi) seriously damaged ryegrass pastures near Belle Glade, FLORIDA, during autumn with spots from 2-3 feet to 15-20 feet in diameter killed. Infestations were spotty in three 160-acre pastures with up to 27 spots noted in a 5-acre area. These pastures would have been destroyed if the aphids had not been parasitized, probably by Aphidius sp. This is the first report of economic damage in Florida by a species of the apple grain aphid complex.

APPLE GRAIN APHID (Rhopalosiphum fitchii) was light in bluegrass seed fields in June in Walla Walla County, WASHINGTON. POTATO APHID (Macrosiphum euphorbiae) and 2 other APHIDS (Acyrtosiphon dirhodum and R. padi) were abundant on several grasses in Benton, Linn, Polk, and Marion Counties, OREGON.

YELLOW SUGARCANE APHID (Sipha flava) was light in pastures in the Everglades of FLORIDA due to a decrease in Pangola grass acreage. Damage ranged moderate to serious in October and November in eastern Palm Beach County where Pangola grass is the major pasture variety. RUSTY PLUM APHID (Hysteroneura setariae) was common and widely distributed on many grasses throughout Palm Beach County. ENGLISH GRAIN APHID (Macrosiphum avenae) nymphs ranged 3-5 per head on bluegrass seed fields in Walla Walla County, WASHINGTON, in June.

RHODES-GRASS SCALE (Antonina graminis) and an ARMORED SCALE (Odonaspis ruthae) ranged light to severe on Bermuda grass golf courses in the Clearwater and Largo area of Pinellas County, FLORIDA, during fall and early winter. A very heavy infestation was present on one golf course. A. graminis was heavy on Tiftgreen and Bermuda grass lawns during September and October in Maricopa, Pinal, and Yuma Counties, ARIZONA. O. ruthae was found on St. Augustine grass in early December in west Phoenix, Maricopa County. O. ruthae was observed for the first time in southern ALABAMA in several fields of heavily diseased Bermuda grass.

A CICADA (Diceroprocta apache) was dominant in southern NEVADA and other CICADAS (Okanagana spp. and Platyedra spp.) were found in other areas. Cicadas were the heaviest in several years. The populations present in early June peaked in the northern counties in mid-July and decreased slowly. Most native shrubs and small trees were damaged by cicada oviposition.

A WHITEFLY (Aleurocybotus occiduus) was heavy in many Bermuda grass seed fields during November in Yuma County, ARIZONA, and controls were required.

GRASS THRIPS (Anaphothrips obscurus) was again heavy on timothy in Lyon County, NEVADA, from early April through May and controls were required. Other THRIPS (Chirothrips spp.) were active from mid-May through September on Bermuda grass seed heads at Yuma County, ARIZONA. Controls were necessary throughout the season.

A BROMEGRASS SEED MIDGE (Stenodiplosis bromicola) was much lighter in 1967 than in 1966 in NEBRASKA. Infestations averaged 1.5-2.0 percent across the State. This seed midge was reported for the first time in Cedar, Dixon, Dakota, Wayne, Thurston, Stanton, Cuming, Burt, Platte, Polk, Colfax, Dodge, Washington, Douglas, Sarpy, Otoe, Johnson, Nemaha, Richardson, Pawnee, Jefferson, Thayer, Nuckolls, Webster, Franklin, Phelps, Gosper, Dawson, Frontier, Hitchcock, and Lincoln Counties during 1967.

MOLE CRICKETS (Scapteriscus spp.) were severe on various lawns and golf courses throughout FLORIDA in the warmer months and very severe on Bermuda grass from early 1967 until October at St. Petersburg. Infestations were very severe on a Bahia grass golf course in Pinellas County and damage was severe on a 150-acre area on a turf farm in Zellwood, Orange County, during the summer. Numbers were severe on pastures in the Alachua County area, and controls were required to save a 400-acre mixed centipede grass pasture during late March and early April. Adult damage was heavy on 40 acres of improved pastures during early August. FIELD CRICKETS (Gryllus spp.) were usually abundant on rangelands in Colusa County, CALIFORNIA.

A BILLBUG (Sphenophorus sp.) damaged lawns in Pershing County, NEVADA, for the second consecutive year. Populations were the heaviest since the initial discovery. S. venatus confluens was heavier in 1967 than in past years on grass seed fields in Benton, Linn, and Marion Counties, OREGON. BLUEGRASS BILLBUG (S. parvulus) extended its range in UTAH. Damage to lawns increased in Salt Lake County. This billbug damaged lawns in the panhandle area and in Hall County, NEBRASKA. Mixed populations of S. venatus vestitus and S. parvulus infested zoysia

and Bermuda grass turf throughout the Wichita area of KANSAS. More infestations were found although damage at each site was less severe because of increased precipitation. Infestations were again found in Sedgwick and Johnson Counties and an additional infestation was reported from Crawford County. There have been no successful treatments. Larvae of Sphenophorus spp. killed many zoysia lawns in suburban Prince Georges and Montgomery Counties, MARYLAND.

WHITE GRUBS damaged lawns in Salt Lake and Weber Counties, and in many other areas of UTAH. Phyllophaga sp. caused heavy damage to native and brome grass pastures in northeastern, southeastern, and south-central KANSAS in May and June. Larvae were heavy and caused severe damage to pastures in Buffalo, Hall, Kearney, Pierce, Phelps, Brown, Cherry, and Polk Counties, NEBRASKA.

NORTHERN MASKED CHAFER (Cyclocephala borealis) larvae caused heavy damage to several lawns in suburban areas of MARYLAND. Cyclocephala spp. larvae damaged much grass in Montgomery, Fairfax, Dickenson, and Russell Counties, VIRGINIA, in late September and October. Damage, possibly caused by C. parallela, was serious on 200 acres of Bahia grass pasture at Belle Glade, FLORIDA. Larvae ranged 10-25 per square foot of sod. ORIENTAL BEETLE (Anomala orientalis) larval infestations increased in northern NEW JERSEY.

A FLEA BEETLE (Chaetocnema magnipunctata) severely damaged dichondra lawns in several areas in southern CALIFORNIA.

SOD WEBWORMS (Crambus spp.) were heavy early in the season in RHODE ISLAND, but in late summer adult flights were lighter than in 1966. Populations of an unspecified sod webworm were heavy in southern NEW JERSEY but not so severe as in 1966. Infestations were light to moderate in central and northern counties. Crambus spp. infestations were abundant in eastern SOUTH DAKOTA in the late summer and early fall. Controls were required on a golf course at Brookings. These pests were heavy in some lawns in NEBRASKA, particularly in the Panhandle. Crambus spp. larvae were very active in lawns in Yuma, Maricopa, and Pinal Counties, ARIZONA, in early July. In CALIFORNIA, C. sperryellus infested lawns in many areas.

BLUEGRASS WEBWORM (Crambus teterrellus) was unusually heavy around home lawns in KANSAS early in the season, but the expected buildup of damage did not develop. Adults were often seen in large numbers in the open range areas of MONTANA where the damage was seldom noticed. However, damage was evident in lawns in Lewistown, Libby, Malta, Shelby, and Great Falls.

BUFFALO-GRASS WEBWORM (Surattha indentella) damaged buffalo grass on golf courses in Fairview, Waynoka, Shattuck, Woodward, Seiling, Roman Nose State Park, Elk City, and Sayre, OKLAHOMA. Numbers ranged up to 12 per square foot in favorable areas at Fairview and 1-3 per square foot at other locations. During May and early June, golf course infestations in Stafford and Pawnee Counties, KANSAS, were heavier in 1967 than in 1966. Above normal precipitation apparently killed many developing larvae. Treatment in mid-June greatly reduced the golf course infestation in Rice County. Infestations were found in buffalo grass fairways in Kingman, Pratt, Rice, Ellsworth, Edwards, and Barber Counties and on buffalo grass farmyards in Barton and Meade Counties. Surveys were negative in buffalo grass fairways on golf courses in 15 adjacent counties on the east, north, and west of known infestations, but farmyards in these 15 counties may be infested.

GRASSWORMS (Mocis spp.) killed 120 acres of ryegrass in a 160-acre pasture and moderately damaged the remainder of this pasture as well as 2 other ryegrass pastures on ranches near Belle Glade, FLORIDA. Damage was moderate to Para grass in various spots in the Everglades throughout the summer and fall. At Bradenton, moths were more numerous during the late summer and early fall than any time in 26 years of observation.

FALL ARMYWORM (Spodoptera frugiperda) larvae were the heaviest in several years on a lawn in Bradenton, FLORIDA. The 105 days of drought early in 1967 could have altered the normal cycle. Infestations in Coastal Bermuda and other grass-hay crops were much higher and more widespread in ALABAMA in 1967 than in any year since 1962. Fall armyworm was the principal pest of pastures in ARKANSAS. Populations were economic in July and August and controls were required. Infestations were the earliest, the heaviest, and the most widespread ever known on many hosts. Numbers were economic on hay and lawns in nearly all areas of TEXAS except for the High Plains.

CUTWORMS were unusually abundant in CALIFORNIA. BLACK CUTWORM (Agrotis ipsilon) and VARIEGATED CUTWORM (Peridroma saucia) were very common and damaging to lawns in the State. LESSER CORNSTALK BORER (Elasmopalpus lignosellus) was moderate on ryegrass pastures during fall and winter in north FLORIDA but not so severe as in 1966. A PSYCHID MOTH (Apterona crenulella) caused moderate damage to a variety of range forage plants in scattered areas of UTAH and was most extensive in Sevier County.

A PYRAUSTID MOTH (Herpetogramma phaeopteralis) was severe on St. Augustine grass and other turf grasses through November in Orlando area, FLORIDA. Numbers were heavy and browning was evident on experimental strips of improved Bermuda grass at Boynton Beach, Palm Beach County, in September. Populations were also heavy on about 1,000 acres of St. Augustine grass commercial sod in Palm Beach County. This was one of the worst infestations on commercial sod ever observed and was aided by an unusually heavy prolonged rainfall which prevented normal spray applications. A PYRALID MOTH (Marasmia trapezalis) was heavy on pasture grasses, especially Para grass, from July through November in Florida. Infestations or damage covered 25-75 percent of the leaf terminals in Para grass pastures. Larvae of a SATURNIID MOTH (Hemileuca eglanderina) infested over 2,000 acres of prime snowberry range in the Monroe Mountains, Sevier County, UTAH. Larvae were full grown before serious defoliation occurred. WHITE-LINED SPHINX (Celerio lineata) was heavier than normal on range plants, especially in central and northern NEVADA.

TENT CATERpillars (Malacosoma spp.) defoliated more than 5,000 acres of bitterbrush on excellent range areas of Monroe Mountain, Sevier County, and damage to range plants was spotty in Cache and Rich Counties, UTAH. GREAT BASIN TENT CATERpillar (M. fragile) damage was heavy on antelope bitterbrush in northern Klamath County, OREGON, where controls were considered.

BERMUDAGRASS MITE (Aceria neocynodonis) infestations were reported from most sections of TEXAS, but were most common in the northwest area. Damage was light to moderate on Bermuda grass lawns in central, east-central, and southwest OKLAHOMA from June to August. BANKS GRASS MITE (Oligonychus pratensis) was again heavy on timothy in Lyon County, NEVADA, from early April through May and required controls. WINTER GRAIN MITE (Penthaleus major) was very heavy on orchard grasses in Lassen County, CALIFORNIA.

Preparation of Notes for Cooperative Economic Insect Report

Requests have been received relative to the type of information desired for the Cooperative Economic Insect Report and suggestions made for revision in the format.

The report will be reorganized on a principal crop basis. This will simplify present format and make the material more accessible and useful. It is hoped this approach will also stimulate greater participation by pointing out lack of reporting on individual crop problems. Efforts will be made to evaluate and present the information in ways to make it more useful in insect control.

Forecasting statements will be developed wherever field reports support such action. Reporters are encouraged to include this vitally important information in their notes. Emphasis of the Cooperative Economic Insect Report will be on the important insect problems of a regional nature, notes on routine insect occurrence will be kept to a minimum. Routine notes submitted on common insects will be added to the National insect files as warranted, however.

The following guidelines are suggested for preparation of notes. It is realized that all of the information outlined will not be available in each situation, but give the following information when possible.

1. Common (if available) and scientific name of species involved. Stages of insect involved. (If a taxonomic problem exists, it should be noted).
2. Location (definite, recognized area within state, such as region, county or town), date, name of observer or reporter. If note is for period other than current reporting period, give date of observation.
3. Host involved, scope and extent of infestation in number of counties, acres, trees, animals, etc. Also stage of host.
4. Quantitative evaluation of infestation according to recognized survey methods. Where such methods are not available, give numerical data such as number per linear foot, per plant, per sweep or per animal. These data should be based on a representative sampling. An adjectival rating should be accompanied by a numerical rating.
5. Estimation of extent of injury or damage.
6. Comparisons with previous infestations, outlook or predictions for future infestations, unusual influences.
7. Status of natural or applied control.
8. When reporting new State, United States, or North America records, include the above information insofar as applicable, as well as name of taxonomist making determination.

Examples of notes including these data are as follows:

EUROPEAN RED MITE (Panonychus ulmi) - Egg populations have reached point where protective sprays are warranted in 10 percent of apple orchards in Knox County. Counts on June 30 showed 0 to 4.8 live mites per leaf and 0 to 37.6 eggs per leaf. Further increase and spread expected with continued favorable weather. (Jackson, July 2).

EUROPEAN CORN BORER (Ostrinia nubilalis) - Oviposition and hatch practically complete in central counties. Fifty egg masses per 100 stalks in northwest area. In southern counties, all corn 35 inches or taller, 70 to 100 percent infested with 2 to 22 larvae per stalk. Larvae from first to third instar. (Smith).

THE HISTORY OF THE UNITED STATES OF AMERICA

The history of the United States of America is a story of growth and development, from a small colony to a great nation.

The first settlers came to the New World in search of a better life, and they found it in the land of the free.

The American people have always been proud of their freedom, and they have fought to protect it.

The United States has been a beacon of hope for people all over the world, and it will continue to be so.

The American dream is a dream of a better life, and it is a dream that has inspired millions of people.

The United States has a rich and diverse culture, and it is a culture that has made the world a better place.

The American people are a proud and free people, and they are a people who love their country.

The United States has a long and glorious history, and it is a history that has made the world a better place.

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